If $\dfrac{dy}{dt} = -3y$ and $y(1) = 5$, find $y(10)$.

A. $y(10) = e^{-27}$

B. $y(10) = e^{-29}$

C. $y(10) = 5e^{-29}$

D. $y(10) = e^{-30}$

E. $y(10) = 5e^{-30}$

F. $y(10) = 5e^{-27}$

Tries 0/99

Given that the radioactive isotope Plutonium-240 has a half-life of 6563 years, what is its decay rate, k?

A. $-\frac{1}{2}$

B. $\frac{\ln 2}{6563}$

C. $-\frac{2}{6563}$

D. -6563

E. $-\frac{1}{6563}$

F. $\frac{\ln \frac{1}{2}}{6563}$

Tries 0/99

Evaluate $\displaystyle\int_0^2 (3x^2 - 2x + 7e^x)\, dx$.

A. $7e^2 + 13$

B. $7e^2 - 1$

C. $7e^2 - 8$

D. $7e^2 + 11$

E. $7e^2 + 4$

F. $7e^2 - 3$

Tries 0/99

Find the Left Riemann Sum that approximates the area under the curve of $y = e^{4x}$ on the interval $[0, 2]$ with 8 rectangles.

A. $\sum_{i=0}^{9} \frac{1}{4} e^{i}$

B. $\sum_{i=1}^{9} \frac{1}{4} e^{i}$

C. $\sum_{i=1}^{7} \frac{1}{4} e^{2i}$

D. $\sum_{i=0}^{8} \frac{1}{4} e^{\frac{i}{2}}$

E. $\sum_{i=1}^{8} \frac{1}{4} e^{i}$

F. $\sum_{i=0}^{7} \frac{1}{4} e^{i}$

Tries 0/99

If $\int_a^b \ 2f(x)\ dx = 1$ and $\int_a^c \ -\frac{1}{2} f(x)\ dx = 1$, where a, b and c are some constants, find $\int_b^c \ f(x)\ dx$.

A. $-\frac{3}{2}$

B. 1

C. 0

D. $\frac{5}{2}$

E. $\frac{3}{2}$

F. $-\frac{5}{2}$

Tries 0/99

Compute the signed area of the region bounded by $y = 8 - 2x^2$ and $y = 0$ for $0 < x < 3$.

A. -18

B. 12

C. $\frac{40}{3}$

D. 6

E. -12

F. $\frac{46}{3}$

Tries 0/99

Evaluate the definite integral $\int_0^1 \frac{x^2 - x^3}{2\sqrt{x}} dx$.

A. $\frac{4}{35}$

B. $\frac{4}{15}$

C. $\frac{12}{35}$

D. $\frac{2}{35}$

E. $\frac{2}{15}$

F. $\frac{4}{5}$

Tries 0/99

The rate of change of a certain population of bacteria is modeled by $P'(t) = 2\sqrt{t}\,(10t + 3)$, where t is in hours. What is the increase in the bacteria population between $t = 4$ and $t = 9$ hours?

A. 386

B. 558

C. 2052

D. 1764

E. 172

F. 852

Tries 0/99

Evaluate $\int_0^{\frac{\pi}{3}} (\sec^2 t + \sin t)\ dt$.

A. $\frac{\sqrt{3}}{2}$

B. $\frac{\sqrt{3}}{2} + \frac{1}{2}$

C. $\sqrt{3} - \frac{1}{2}$

D. $\sqrt{3} + \frac{1}{2}$

E. $\frac{\sqrt{3}}{3} - \frac{1}{2}$

F. $\frac{\sqrt{3}}{4}$

Tries 0/99

Use the Trapezoidal Rule to approximate the integral $\int_1^4 e^{\left(x^2-1\right)}\ dx$ with 3 trapezoids.

A. $T_3 = e^3 + e^8 + e^{15}$

B. $T_3 = \frac{1}{2} + 2e^3 + 2e^8 + 2e^{15}$

C. $T_3 = 1 + e^3 + e^8 + e^{15}$

D. $T_3 = \frac{1}{2} + e^3 + e^8 + \frac{1}{2}e^{15}$

E. $T_3 = \frac{1}{4} + \frac{1}{2}e^3 + \frac{1}{2}e^8 + \frac{1}{4}e^{15}$

F. $T_3 = e^3 + e^8 + \frac{1}{2}e^{15}$

Tries 0/99

Given $\dfrac{dy}{dt} = \dfrac{1}{2}y$ and $y(0) = 2$, find $y(4)$.

A. $y(4) = e^2$

B. $y(4) = 2e^{\frac{1}{2}}$

C. $y(4) = e^4$

D. $y(4) = 2e^2$

E. $y(4) = 2e^4$

F. $y(4) = 4e^{\frac{1}{2}}$

Tries 0/99

If we deposit \$1000 into a savings account which compounds interests continually, at an annual rate of 5%, how many years will it take for the money to double?

A. $\frac{\ln 2}{5}$ years

B. $2\ln 2$ years

C. $5\ln 2$ years

D. $20\ln 2$ years

E. $\ln 2$ years

F. $\frac{\ln 2}{2}$ years

Tries 0/99

Use the Left Riemann Sum to approximate $\int_1^3 x^3\,dx$ with four rectangles.

A. 54

B. 20

C. 27

D. 14

E. 28

F. 10

Tries 0/99

Compute

$$\int_{-\pi}^{1} (3x + \pi)\, dx.$$

A. $\dfrac{3}{2}(1 - \pi^2)$

B. $\dfrac{3}{2}(1 + \pi^2)$

C. $\frac{3}{2} + 2\pi - \frac{\pi^2}{2}$

D. $\frac{3}{2} + \pi - \frac{\pi^2}{2}$

E. $\frac{3}{2} + \pi + \frac{\pi^2}{2}$

F. $\frac{3}{2} + 2\pi + \frac{\pi^2}{2}$

Tries 0/99

Find the area of the region bounded by $x = 0$, $x = 10$, $y = 0$, and $y = x^3 + 5$.

A. 600

B. 1050

C. 1850

D. 2550

E. 300

F. 2200

Tries 0/99

Compute

$$\int_0^{\ln(10)} e^x \, dx$$

A. $e^{10} - 1$

B. $9 - e$

C. 11

D. 9

E. $e^{\ln(10)}$

F. $11 - e$

Tries 0/99

You have just placed \$300 into a bank account that earns interest at an annual rate of 7% compounded continuously. How much money will be in your bank account 3.5 years from now? Round your answer to the nearest cent.

A. \$363.34

B. \$437.36

C. \$415.79

D. \$383.29

E. \$321.74

F. \$453.42

Tries 0/99

You have just placed \$800 into a bank account that accumulates interest with continuous compounding. If 20 years from now you will have \$1200, how much money will you have in your bank account 30 years from now? Round your answer to the nearest cent.

A. \$1469.69

B. \$1400.00

C. \$600.00

D. \$1546.63

E. \$1342.23

F. \$1537.32

Tries 0/99

Suppose that the half life of some radioactive isotope is 50,000 years. If you start out with 2,500 grams of this radioactive isotope, how much will be left after 65,000 years? Round your answer to the nearest whole number.

A. 1015 grams

B. 983 grams

C. 1005 grams

D. 994 grams

E. 1028 grams

F. 920 grams

Tries 0/99

Suppose that the half-life of some radioactive material is 2 years. If you start with $1,024,000$ pounds of this radioactive material, how long will it be until there are only $1,000$ pounds left? Round your answer until the nearest year.

A. 20 years

B. 40years

C. 15 years

D. 100 years

E. 60 years

F. 10 years

Tries 0/99

Evaluate the following integral

$$\int_1^4 \frac{x + x^2}{\sqrt{x}} dx.$$

A. $\frac{256}{15}$

B. $\frac{268}{15}$

C. 8

D. $\frac{3}{4}$

E. 26

F. 38

Tries 0/99

Let $f(x)$ and $g(x)$ be functions with antiderivatives $F(x)$ and $G(x)$ respectively.

Given that $F(3) = 3$, $G(3) = 5$, $F(6) = 1$, and $G(6) = 6$, evaluate the following integral

$$\int_3^6 (3f(x) - 4g(x))\ dx$$

A. -10

B. 20

C. -32

D. -50

E. -9

F. 11

Tries 0/99

Given that $\int_1^8\ f(x)\ dx = 3$, $\int_0^4\ f(x)\ dx = -7$, and $\int_0^8\ f(x)\ dx = 10$, find

$$\int_1^4\ f(x)\ dx.$$

A. -14

B. 0

C. 10

D. -20

E. -8

F. 6

Tries 0/99

Find the expression that represents the Left Riemann Sum of the (signed) area under the curve of $y = x^2 \sin x$ on the interval of $[5, 15]$ with 80 rectangles.

A. $\sum_{i=0}^{79} \frac{1}{8}\left(5+\frac{i}{8}\right)^2 \sin\left(5+\frac{i}{8}\right)$

B. $\sum_{i=0}^{79} \frac{1}{8}\left(5^2+\frac{i}{8}\right) \sin\left(5+\frac{i}{8}\right)$

C. $\sum_{i=0}^{79} \left(5+\frac{i}{8}\right)^2 \sin\left(5+\frac{i}{8}\right)$

D. $\sum_{i=0}^{79} (5+i)^2 \sin(5+i)$

E. $\sum_{i=0}^{79} \frac{1}{8}\left(\frac{i}{8}\right)^2 \sin\left(\frac{i}{8}\right)$

F. $\sum_{i=0}^{79} \left(\frac{i}{8}\right)^2 \sin\left(\frac{i}{8}\right)$

Tries 0/99

Find the signed area of the region bounded by the graphs of the following equations

$$x = 3,\ x = 5,\ y = 0,\ y = 3x^2 + 4x.$$

A. 130

B. $\frac{604}{3}$

C. 166

D. 56

E. 86

F. 358

Tries 0/99

The velocity function, in meters per second, of a particle moving is given by

$$v(t) = 5t - 2,$$

where t is time in seconds. Find the displacement of the particle from $t = 0$ seconds to $t = 6$ seconds.

A. 78 meters

B. 88 meters

C. 28 meters

D. $\frac{4}{5}$ meters

E. $\frac{10}{9}$ meters

F. 102 meters

Tries 0/99

A faucet is turned on and water begins to flow into a tank at a rate of

$$r(t) = 10\sqrt{t}$$

cubic feet per hour, where t is in hours. How many hours later will there be $\frac{160}{3}$ cubic feet of water in the tank?

A. 4

B. 8

C. 3

D. 2

E. 6

F. $16\sqrt{2}$

Tries 0/99

Which of the following gives the correct expression for the approximation of

$$\int_1^3 \ln(x^2+3)\ dx$$

using the Trapezoidal Rule with $n = 4$ trapezoids?

A. $\frac{1}{4}(\ln 4 + 2\ln\frac{21}{4} + 2\ln 7 + 2\ln\frac{37}{4} + \ln 12)$

B. $\frac{1}{2}(\ln 4 + 2\ln\frac{21}{4} + 2\ln 7 + 2\ln\frac{37}{4} + \ln 12)$

C. $\frac{1}{2}(\ln 4 + \ln\frac{9}{2} + \ln 5 + \ln\frac{11}{2} + \ln 6)$

D. $\frac{1}{4}(\ln 4 + \ln\frac{9}{2} + \ln 5 + \ln\frac{11}{2} + \ln 6)$

E. $\frac{1}{4}(\ln 4 + 2\ln\frac{9}{2} + 2\ln 5 + 2\ln\frac{11}{2} + \ln 6)$

F. $\frac{1}{4}(\ln 4 + \ln\frac{21}{4} + \ln 7 + \ln\frac{37}{4} + \ln 12)$

Tries 0/99

Given that $\dfrac{dy}{dt} = 60y$ and $y(0) = 120$, find $y(t)$.

A. $y(t) = \ln(60t + 120)$

B. $y(t) = 120e^{60t}$

C. $y(t) = 120e^{t} + 60t$

D. $y(t) = e^{60t} + 120 - e$

E. $y(t) = 60t + 120$

F. $y(t) = e^{60t} + 120$

Tries 0/99

Evaluate

$$\sum_{i=2}^{5} \frac{i(i+1)}{2}.$$

A. 9

B. 34

C. 28

D. 58

E. 47

F. 72

Tries 0/99

The half-life of carbon-14 is about 5715 years. Explorers found a mummy containing only 70% of the amount of this isotope that is normally found in living human beings. How old is this mummy? Round your answer to the nearest integer.

A. 853 years old

B. 2941 years old

C. 3202 years old

D. 2536 years old

E. 1245 years old

F. 2823 years old

Tries 0/99

Joe has invested $\$50,000$ in a fund which pays him 8% a year, continuously compounded. He estimates that he can retire with $\$200,000$. How long will that take?

A. 13.65 years

B. 17.33 years

C. 19.42 years

D. 25.96 years

E. 15.21 years

F. 30.26 years

Tries 0/99

The population of a city has been growing at a rate that is proportional to the population itself. According to census data, the population was 150 thousand people in 2000, and 170 thousand in 2010. Assuming that trend continues, how many people will be in this city by the year 2020 when the next census will take place? Round your answer to the nearest integer.

A. $182,365$ people

B. $192,667$ people

C. $178,389$ people

D. $201,624$ people

E. $195,223$ people

F. $261,325$ people

Tries 0/99

Use the left Riemann sum with $n = 5$ to approximate the area under the graph of the curve $f(x) = x \ln x$ over the interval $[1, 11]$. Give your answer with two decimal digits of accuracy.

A. 26.38

B. 89.48

C. 94.21

D. 71.12

E. 44.74

F. 142.23

Tries 0/99

Use the right Riemann sum with $n = 200$ to approximate the area under $f(x) = x^2 e^{2x}$ over the interval $[0, 100]$.

A. $R_{200} = \frac{1}{2} \sum_{i=0}^{199} x_i^2 e^{2x_i}$

B. $R_{200} = \frac{1}{2} \sum_{i=1}^{200} x_i^2 e^{2x_i}$

C. $R_{200} = \frac{1}{2} \sum_{i=1}^{200} x_i^3 e^{2x_i}$

D. $R_{200} = \sum_{i=0}^{199} x_i^2 e^{2x_i}$

E. $R_{200} = \sum_{i=1}^{200} x_i^2 e^{2x_i}$

F. $R_{200} = \sum_{i=1}^{200} x_i^3 e^{2x_i}$

Tries 0/99

Compute the signed area of the region bounded by the curves $y = 2 + \sin x$, $y = 0$, $x = 0$ and $x = 2\pi$.

A. $4\pi - 2$

B. 4π

C. $8\pi - 2$

D. 8π

E. 0

F. $\frac{3\pi}{2}$

Tries 0/99

Compute the definite integral $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} (2\sec^2\theta + 3\theta)\ \mathrm{d}\theta$.

A. $\frac{52\sqrt{3}}{27} + \frac{\pi^2}{2}$

B. $\frac{4\sqrt{3}}{3} + \frac{\pi^2}{8}$

C. $\frac{3\sqrt{3}}{3} + \frac{\pi^2}{4}$

D. $\frac{4\sqrt{3}}{3} + \frac{\pi^2}{4}$

E. $\frac{52\sqrt{3}}{27} + \frac{\pi^2}{8}$

F. $\frac{3\sqrt{3}}{3} + \frac{\pi^2}{2}$

Tries 0/99

Evaluate $\int_1^8 (2x - \frac{\sqrt[3]{x}}{3})\ \mathrm{d}x$.

A. 15

B. $\frac{237}{4}$

C. $\frac{138}{3}$

D. $\frac{256}{81}$

E. $\frac{25}{16}$

F. $\frac{153}{5}$

Tries 0/99

Evaluate $\displaystyle\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \csc x(2\csc x + 3\cot x)\ \mathrm{d}x$.

A. $2\sqrt{3} - 1$

B. $3\sqrt{2} - 1$

C. $3\sqrt{5} - 3$

D. $\frac{3\sqrt{2}}{5} - 4$

E. $2\sqrt{2} - 3$

F. $2\sqrt{5} - 1$

Tries 0/99

Find the signed area enclosed by the region bounded by the curves of

$$y = \frac{x + \sqrt[4]{x}}{\sqrt{x}},\ y = 0,\ x = 0 \text{ and } x = 16.$$

A. $\frac{80}{3}$

B. 120

C. $\frac{21}{20}$

D. 240

E. $\frac{160}{3}$

F. $\frac{156}{5}$

Tries 0/99

The growth rate of the population of a country is given by $P'(t) = \sqrt[3]{t}\,(2651t + 2210)$, where t is in years and $t = 0$ corresponds to 2010. How much did the population grow from 2010 to 2013? Round your answer to the nearest integer.

A. $35,774$ people

B. $19,030$ people

C. $17,925$ people

D. $42,555$ people

E. $21,919$ people

F. $23,223$ people

Tries 0/99

Use the trapezoidal rule with $n = 5$ to approximate the integral $\int_1^6 e^x \ln x \, \mathrm{d}x$. Round your answer to the nearest integer.

A. 564

B. 321

C. 80

D. 1406

E. 703

F. 111

Tries 0/99

Given $\frac{dy}{dt} = -4y$ and $y(3) = 42$, find $y(5)$.

A. $42e^{-20}$

B. $42e^{14}$

C. $42e^{12}$

D. $42e^{-36}$

E. $42e^{-8}$

F. $42e^{32}$

Tries 0/99

Jasmine and Bella start at the same spot and run back and forth on a straight road. Jasmine's velocity is $v(t) = t+2$ feet per second, and Bella's velocity is $v(t) = 3\sqrt{t}$ feet per second. Which of the following statements is true about their displacements after $t = 4$ seconds?

A. Jasmine's displacement is negative while Bella's displacement is positive.

B. Jasmine's displacement is positive while Bella's displacement is negative.

C. Jasmine's displacement is greater than Bella's displacement.

D. Both of their displacements are negative.

E. Jasmine's displacement equals to Bella's displacement.

F. Jasmine's displacement is less than Bella's displacement.

Tries 0/99

Evaluate the sum $\sum_{i=0}^{3}(-i^2 + 2i + 1)$.

A. -30

B. -27

C. 27

D. -2

E. 2

F. 30

Tries 0/99

Use the left Riemann sum with 120 rectangles to estimate the signed area under $y = 2\cos(3x)$ on the interval $[0, 2\pi]$. Give the answer in sigma notation.

A. $\sum_{i=0}^{120} \frac{\pi}{30}\cos(\frac{1}{60}\pi i)$

B. $\sum_{i=0}^{119} \frac{\pi}{60}\cos(\frac{1}{60}\pi i)$

C. $\sum_{i=0}^{120} \frac{\pi}{60}\cos(\frac{1}{20}\pi i)$

D. $\sum_{i=0}^{119} \frac{\pi}{30}\cos(\frac{1}{60}\pi i)$

E. $\sum_{i=0}^{119} \frac{\pi}{30}\cos(\frac{1}{20}\pi i)$

F. $\sum_{i=1}^{120} \frac{\pi}{30}\cos(\frac{1}{20}\pi i)$

Tries 0/99

Given $\int_{-5}^{-2} 2f(x)\ dx = 6$ and $\int_{0}^{-2} f(x)\ dx = 1$, compute $\int_{-5}^{0} 3f(x)\ dx$.

A. 21

B. 18

C. 5

D. 7

E. 6

F. 15

Tries 0/99

Given $\int_1^3 f(x)\ dx = 7$, $\int_3^1 g(x)\ dx = 2$ and $\int_1^3 h(x)\ dx = -3$, compute $\int_1^3 (f(x) + g(x) + 2h(x))\ dx$.

A. 2

B. -5

C. 6

D. -3

E. -1

F. 3

Tries 0/99

Consider $f(x) = (x + 1)^2$. Ethan approximates the area under $f(x)$ on the interval $[0, 2]$ using the right Riemann sum with 2 rectangles. Vincent approximates the area under $f(x)$ on the interval $[0, 2]$ using the Trapezoidal Rule with 2 trapezoids. Let E be Ethan's estimate and V be Vincent's estimate. What is $E - V$?

A. 9

B. 8

C. 14

D. 13

E. 4

F. 5

Tries 0/99

Given $f(x) = \dfrac{x-1}{\sqrt{x}-1}$. Find $\lim_{x \to 1} f(x)$ numerically.

x	0.9	0.99	0.999	0.9999	1	1.0001	1.001	1.01	1.1
$f(x)$					—				

A. 2

B. -1

C. $-\infty$

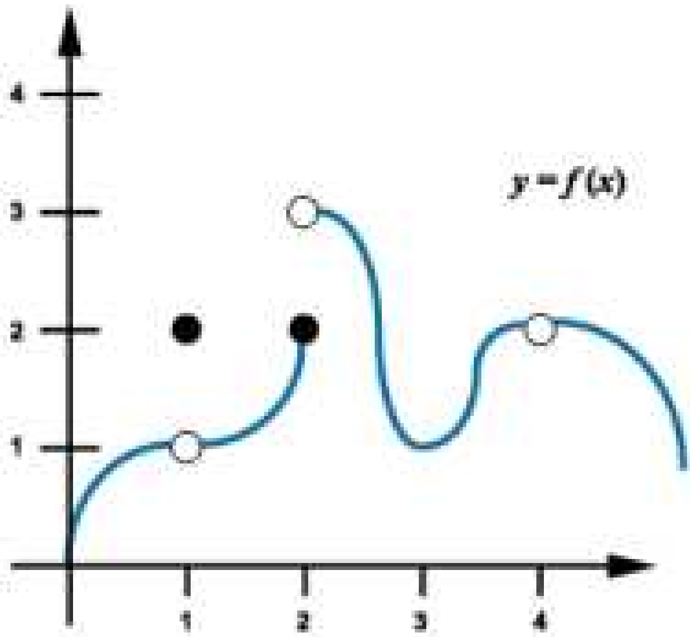
D. ∞

E. 0

F. 1

Tries 0/99

Choose the correct statement(s) regarding $f(x)$.



I. $f(x)$ is discontinuous at $x = 1, x = 2$ and $x = 4$.
II. $\lim_{x\to 2} f(x) = 2$.
III. $\lim_{x\to 4} f(x)$ does not exist
IV. $\lim_{x\to 1} f(x) = 2$.

A. I only

B. II and IV only

C. II and III only

D. I and IV only

E. I and II only

F. IV only

Tries 0/99

Which of the following function has a vertical asymptote at $x = -3$?

A. $y = \frac{x-3}{x^2-9}$

B. $y = \frac{x^2-9}{x-3}$

C. $y = \frac{x+3}{3-x}$

D. $y = \frac{x+3}{x-3}$

E. $y = \frac{x^2+3x}{x+3}$

F. $y = x + 3$

Tries 0/99

Which of following does NOT equal to positive infinity ($+\infty$)?

A. $\lim\limits_{x\to 2^-} \dfrac{x+2}{x-2}$

B. $\lim\limits_{x\to 0^+} \dfrac{1}{x}$

C. $\lim\limits_{x\to 1} \dfrac{1}{(x-1)^2}$

D. $\lim\limits_{x\to 3^+} \dfrac{x}{\sqrt{x^2-9}}$

E. $\lim\limits_{x\to 1^+} \dfrac{1}{x-1}$

F. $\lim\limits_{x\to 0} \dfrac{1}{x^2}$

Tries 0/99

The population P, in thousands, of a small city is given by $P(t) = 10 + \dfrac{50t}{2t^2 + 9}$ where t is the time in years. What is the rate of change of the population at $t = 2$ yr? Round your answer to the third decimal place.

A. 0.173 thousand per year

B. 0.346 thousand per year

C. 5.882 thousand per year

D. 2.941 thousand per year

E. 3.214 thousand per year

F. -1.557 thousand per year

Tries 0/99

Find the limit:

$$\lim_{x \to 2} \frac{x^2}{x^2 + 1}$$

A. $\frac{4}{5}$

B. $\frac{4}{3}$

C. $\frac{2}{3}$

D. 4

E. $\frac{16}{5}$

F. 1

Tries 0/99

A student used the limit process to find the derivative of $f(x) = \frac{x^2}{2}$ and his work is shown below. Which of the following statements is true?

$f'(x) = \lim\limits_{h \to 0} \frac{\frac{(x+h)^2}{2} - \frac{x^2}{2}}{h}$..................(1)
$= \lim\limits_{h \to 0} \frac{x^2+2xh+h^2-x^2}{2h}$.....................(2)
$= \lim\limits_{h \to 0} \frac{2xh+h^2}{2h}$............................(3)
$= \lim\limits_{h \to 0} (x + h^2)$...........................(4)
$= x$....................................(5)

A. He made a mistake in Line (1).

B. He made a mistake in Line (2).

C. He made a mistake in Line (3).

D. He made a mistake in Line (4).

E. He made a mistake in Line (5).

F. He did not make any mistake.

Tries 0/99

Given $f(x) = \dfrac{1}{x+1}$, and $g(x) = \dfrac{x-1}{x^2-1}$, which of the following statements is false?

A. $\lim\limits_{x \to -1} f(x)$ does not exist.

B. $\lim\limits_{x \to -1} g(x)$ does not exist.

C. $g(x)$ has a vertical asymptote at $x = -1$

D. $f(x)$ has a vertical asymptote at $x = -1$

E. $\lim\limits_{x \to 1} g(x)$ does not exist.

F. $g(x)$ has a hole at $x = 1$

Tries 0/99

For:

$$f(x) = \begin{cases} x+2 & : x < -1 \\ -x-2 & : x \geq -1 \end{cases}$$

Choose the number of correct statements below.

I. f is not continuous at $x = -1$.
II. $\lim_{x \to -1^+} f(x) = 1$.
III. $\lim_{x \to -1} f(x) = 1$.
IV. $\lim_{x \to -1^-} f(x) \neq \lim_{x \to -1^+} f(x)$.

A. Only one of the above statements is true.

B. All of the above statements are true.

C. Only three of the above statements are true.

D. Only two of the above statements are true.

E. None of the above statements is true.

Tries 0/99

Find the derivative of $y = (\sin x + \tan x)e^x$.

A. $y' = (\sin x + \cos x + 2\tan x+)e^x$

B. $y' = (\cos x + \tan x \sec x)e^x$

C. $y' = (\sin x + \cos x + \tan x + \sec x \tan x)e^x$

D. $y' = (\sin x + \cos x + \tan x + \sec x)e^x$

E. $y' = (\sin x + \cos x + \tan x + \sec^2 x)e^x$

F. $y' = (\cos x + \sec^2 x)e^x$

Tries 0/99

Find the equation of the tangent line to the graph of $g(x) = \frac{x^2+32\sqrt{x}}{8}$ at $x = 4$.

A. $y = 2x - 18$

B. $y = 5x + 18$

C. $y = 2x + 10$

D. $y = 5x - 10$

E. $y = 2x + 2$

F. $y = 5x{-}30$

Tries 0/99

Given the piecewise function:

$$f(x) = \begin{cases} x+4 & \text{if } x \leq -2 \\ -x-2 & \text{if } -2 < x \leq 2 \\ x-2 & \text{if } x > 2 \end{cases}$$

Which of the following statements is false?

A. $\lim\limits_{x\to 0^-} f(x) = -2$

B. $\lim\limits_{x\to 0^+} f(x) = -2$

C. $\lim\limits_{x\to 2^+} f(x) = 0$

D. $\lim\limits_{x\to -2^+} f(x) = 0$

E. $\lim\limits_{x\to 2^-} f(x) = -2$

F. $\lim\limits_{x\to -2^-} f(x) = 2$

Tries 0/99

Which of following does NOT equal to positive infinity ($+\infty$)?

A. $\lim_{x \to 4^-} \dfrac{x^2}{\sqrt{16 - x^2}}$

B. $\lim_{x \to 0^+} \dfrac{x+3}{x^2}$

C. $\lim_{x \to 2^-} \dfrac{1}{(x-2)^2}$

D. $\lim_{x \to 3^+} \dfrac{3}{x-3}$

E. $\lim_{x \to 2^+} \dfrac{x+8}{2-x}$

F. $\lim_{x \to 0^-} \dfrac{5x+4}{x^2}$

Tries 0/99

Find the limit: $\lim_{x \to 1} \dfrac{-4x+4}{x^2 - 4x + 3}$

A. $\dfrac{4}{3}$

B. -2

C. DNE

D. 1

E. 2

F. 0

Tries 0/99

Consider the function $f(x) = \dfrac{1}{2x-1}$. When using the definition of derivative (the limit process) to compute $f'(x)$, we would need to find the following limit:

A. $\lim\limits_{h\to 0} \dfrac{h}{(2x+2h-1)(2x-1)}$

B. $\lim\limits_{h\to 0} \dfrac{-h}{(2x+2h-1)(2x-1)}$

C. $\lim\limits_{h\to 0} \dfrac{-h}{(2x+h-1)(2x+2h-1)}$

D. $\lim\limits_{h\to 0} \dfrac{-1}{(2x+h-1)(2x-1)}$

E. $\lim\limits_{h\to 0} \dfrac{-2}{(2x+2h-1)(2x-1)}$

F. $\lim\limits_{h\to 0} \dfrac{h-1}{(2x+h-1)(2x-1)}$

Tries 0/99

Given $f(x) = \dfrac{x^2-9}{x}$, and $f'(x) = \dfrac{x^2+9}{x^2}$. Find the equation of the tangent line to the graph of $f(x)$ at $x = -1$.

A. $y = 8x-18$

B. $y = 10x - 18$

C. $y = 10x-2$

D. $y = 8x-2$

E. $y = 10x + 18$

F. y = 8x + 18

Tries 0/99

Use the graph of f(x) to choose the correct statements.

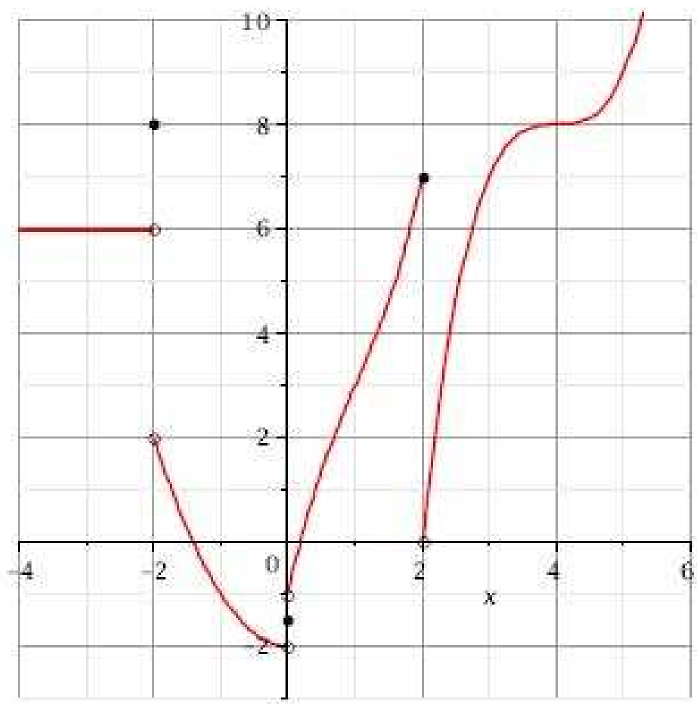


Figure 1: Graph of f(x)

I. f(x) is discontinuous at x=-2, x=0 and x=4.
II. $\lim_{x \to 0^+} f(x) = -1$.
III. $\lim_{x \to 2^-} f(x) = 0$.
IV. $\lim_{x \to 4} f(x) = f(4)$.

A. I and IV only.

B. III and IV only.

C. II and III only.

D. I and III only.

E. II and IV only.

F. I and II only.

Tries 0/99

Which of the following is FALSE for the function

$$f(x) = \begin{cases} -x & \text{if } x < 0 \\ 1 & \text{if } x = 0 \\ x^2 & \text{if } x > 0 \end{cases}$$

A. $\lim_{x\to 1^-} f(x) = \lim_{x\to 1^+} f(x)$

B. $\lim_{x\to -1^-} f(x) = 1$

C. f(x) is continuous at every point except x=0

D. $\lim_{x\to -1} f(x) = 1.$

E. $\lim_{x\to 0} f(x) = 1.$

F. $\lim_{x\to 1} f(x) = 1.$

Tries 0/99

Which of the following is TRUE regarding $f(x) = \dfrac{x+4}{x^2+x-12}$

A. $\lim_{x\to 3} f(x)$ does not exist and $f(x)$ has a vertical asymptote at $x = -4$

B. $\lim_{x\to -4} f(x)$ does not exist and $f(x) hasaholeat x = -4$

C. $\lim_{x\to 3} f(x)$ does not exist and $f(x)$ has a vertical asymptote at $x = 3$

D. $\lim_{x\to -4} f(x)$ does not exist and $f(x)$ has a vertical asymptote at $x = -4$

E. $\lim_{x\to 3} f(x)$ does not exist and $f(x)$ has a hole at $x = -3$

F. $\lim_{x\to -4} f(x)$ does not exist and $f(x)$ has a vertical asymptote at $x = 3$

Tries 0/99

Which of the following limits does NOT equal to $(+\infty)$?

A. $\lim\limits_{x \to 0^-} \dfrac{-2}{x}$

B. $\lim\limits_{x \to 1^+} \dfrac{2x+1}{(x-1)^2}$

C. $\lim\limits_{x \to 1^-} \dfrac{3x}{x^2-1}$

D. $\lim\limits_{x \to 2^+} \dfrac{2}{x-2}$

E. $\lim\limits_{x \to 2^-} \dfrac{x^2}{\sqrt{4-x^2}}$

F. $\lim\limits_{x \to 0} \dfrac{x+5}{x^2}$

Tries 0/99

Find the equation of the tangent line to $f(x) = x - 5\sin x$ at $x = \dfrac{\pi}{2}$.

A. $y = x + \dfrac{\pi}{2}$

B. $y = x - \pi + 5$

C. $y = x - 5$

D. $y = x$

E. $y = \dfrac{\pi}{2}$

F. $y = x + 5$

Tries 0/99

Let $f(x) = \cos x - 2x$, $g(x) = x - \dfrac{1}{3x^3}$ and $h(x) = e^x$. Which of the following is NOT true for all values of $x < 0$?

A. $h'(x) < 1$

B. $f'(x) < h'(x)$

C. $g'(x) < h'(x)$

D. $g'(x) > 0$

E. $f'(x) < g'(x)$

F. $h'(x) > 0$

Tries 0/99

The population P, in thousands, of a certain species of birds is given by:

$$P(t) = 2t^3 + 3t^2 - 4t + 10$$

where t is the number of years. What is the rate of change of population at $t = 2$?

A. 20 thousand per year

B. 10 thousand per year

C. 32 thousand per year

D. 24 thousand per year

E. 46 thousand per year

F. 30 thousand per year

Tries 0/99

Given $f(x) = \dfrac{x^2}{\sin x}$. Find $f'(x)$.

A. $f'(x) = \dfrac{x^2 \cos x + 2x \sin x}{\sin^2 x}$

B. $f'(x) = \dfrac{x^2 \cos x - 2x \sin x}{\sin^2 x}$

C. $f'(x) = \dfrac{2x \sin x - x^2 \cos x}{\sin^2 x}$

D. $f'(x) = \dfrac{2x \sin x - x^2 \cos x}{x^4}$

E. $f'(x) = \dfrac{2x \sin x + x^2 \cos x}{\sin^2 x}$

F. $f'(x) = \dfrac{2x}{\cos x}$

Tries 0/99

Find the slope of the tangent line to the graph of $y = x \cot x$ at $x = \dfrac{\pi}{4}$.

A. 1

B. -1

C. $1 - \dfrac{\pi}{2}$

D. 3

E. $\dfrac{1}{2}$

F. $1 + \dfrac{\pi}{8}$

Tries 0/99

A bowling ball is launched off the top of a 240-foot tall building. The height of the bowling ball above the ground t seconds after being launched is $s(t) = -16t^2 + 32t + 240$ feet above the ground. What is the velocity of the ball as it hits the ground?

A. 64 ft/s

B. 0 ft/s

C. –128 ft/s

D. 32 ft/s

E. 5 ft/s

F. –76 ft/s

Tries 0/99

Given $f(x) = e^x(3x^2 - x + 1)$, find $f'(x)$.

A. $e^x(3x - 1)$

B. $e^x(6x - 1)$

C. $e^x(3x^2 + 5x)$

D. $e^x(3x^2 - x + 1)$

E. $e^x(x - 1)$

F. $e^x(3x^2 - 7x + 2)$

Tries 0/99

Given $h(t) = \dfrac{3t-1}{\sqrt{t}-2}$, find $h'(16)$.

A. $\dfrac{1}{2}$

B. 1

C. $\dfrac{1}{32}$

D. $\dfrac{1}{8}$

E. $\dfrac{1}{16}$

F. $\dfrac{1}{4}$

Tries 0/99

A ball is thrown straight up from the top of a 64-foot building with an initial velocity of 32 feet per second. Use the position function below for free-falling objects and find its velocity after 2 seconds.

$$s(t) = -16\,t^2 + 32\,t + 64$$

A. 32 ft/sec

B. 64 ft/sec

C. -32 ft/sec

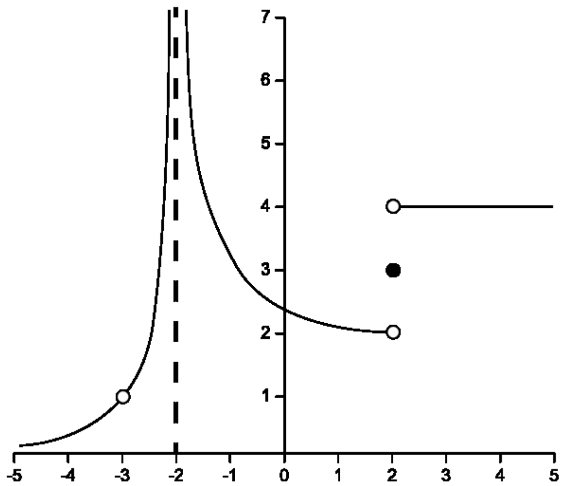
D. 48 ft/sec

E. -16 ft/sec

F. -64 ft/sec

Tries 0/99

If $f(x)$ has the graph sketched below, then $\lim_{x \to 2^-} f(x) =$



A. 4

B. ∞

C. 3

D. 1

E. The limit does not exist.

F. 2

Tries 0/99

Find

$$\lim_{x \to 1} \frac{x^2 + 2x - 3}{x^2 + x - 2}.$$

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $+\infty$

D. $\frac{2}{3}$

E. DNE

F. $\frac{4}{3}$

Tries 0/99

Given

$$f(x) = \begin{cases} 2\cos(x) & x \leq 0 \\ x + 2 & 0 < x < 2 \\ 3 & x \geq 2 \end{cases}$$

Find the discontinuities of $f(x)$.

A. f(x) has jumps at $x = 0$ and at $x = 2$.

B. f(x) has a jump at $x = 2$ and a hole at $x = 0$.

C. f(x) has a hole at $x = 0$.

D. f(x) has a jump at $x = 0$.

E. f(x) has a hole at $x = 2$.

F. f(x) has a jump at $x = 2$.

Tries 0/99

John is deriving the derivative of $f(x)$ using the limit definition and he writes, correctly,

$$f'(x) = \lim_{h \to 0} \frac{3(x+h)^2 - 3x^2}{h}.$$

Which of the following functions could be $f(x)$?

A. $x^3 - 3x^2$

B. $3x^2 - x^3$

C. x^3

D. $3x^3$

E. $3x^2 + x^3$

F. $3x^2$

Tries 0/99

The derivative of $f(x) = 3e^x + \cos(x) - 2x^3$ is:

A. $f'(x) = 3xe^x - \cos(x) - 3x^2$

B. $f'(x) = 3e^x + \sin(x) - 6x^2$

C. $f'(x) = 3xe^{x-1} - \sin(x) - 6x^2$

D. $f'(x) = 3e^x + \sin(x) - 6x$

E. $f'(x) = 3e^x - \cos(x) - 3x^2$

F. $f'(x) = 3e^x - \sin(x) - 6x^2$

Tries 0/99

Given $f(x) = 6\sin x$. Find the equation of the tangent line to the graph of $f(x)$ at $x = \frac{\pi}{3}$.

A. $y = 3\sqrt{3}x + 3$

B. $y = 3\sqrt{3}x - \pi$

C. $y = 3x - \sqrt{3}\pi$

D. $y = 3x - \pi$

E. $y = 3\sqrt{3}x - \sqrt{3}\pi + 3$

F. $y = 3x - \pi + 3\sqrt{3}$

Tries 0/99

The position of a particle moving on a straight line is given by $s(t) = 3t^2 - 12t + 9$, where t is the time in minutes and s is the position in meters. At what time is the velocity zero?

A. $t = 5$ minutes

B. $t = 3$ minutes

C. $t = 1$ minutes

D. $t = 6$ minutes

E. $t = 4$ minutes

F. $t = 2$ minutes

Tries 0/99

The population of a herd of cattle over time (in years) is given by $p(t) = 70\left(4 + 0.1t + 0.01t^2\right)$. What is the growth rate (in cattle per year) when $t = 5$ years?

A. 124

B. 294

C. 78

D. 62

E. 332.5

F. 14

Tries 0/99

Find the derivative of $f(x) = (x^2 - 3x)(5x + 2)$.

A. $10x - 15$

B. $15x^2 - 11x$

C. $5x^3 - 13x^2 - 6x$

D. $10x^2 - 15x + 6$

E. $5x^2 - 15x$

F. $15x^2 - 26x - 6$

Tries 0/99

Given $g(x) = \dfrac{2\sqrt{x}}{x^2 - 8}$. Find $g'(4)$.

A. $-\frac{1}{4}$

B. $-\frac{3}{32}$

C. $\frac{9}{16}$

D. $\frac{7}{8}$

E. $-\frac{9}{8}$

F. $-\frac{7}{16}$

Tries 0/99

Given $y = \tan x(\sec x + 1)$. Find y'.

A. $y' = (\sec x)^3 \tan x$

B. $y' = 2(\sec x)^2 \tan x + \sec x \tan x$

C. $y' = (\sec x)^2 \tan x + 2 \sec x \tan x$

D. $y' = (\sec x)^3 + (\sec x)^2 + (\tan x)^2 \sec x$

E. $y' = (\sec x)^3 + \sec x \tan x + (\tan x)^2 \sec x$

F. $y' = (\tan x)^3 + \tan x \sec x + (\sec x)^2 \tan x$

Tries 0/99

If $h(t) = \sin(3t) + \cos(3t)$, find $h^{(3)}(t)$.

A. $-27\sin(3t) + 27\cos(3t)$

B. $-27\sin(3t) - 27\cos(3t)$

C. $27\sin(3t) + 27\cos(3t)$

D. $\sin(3t) + \cos(3t)$

E. $\sin(3t) - \cos(3t)$

F. $27\sin(3t) - 27\cos(3t)$

Tries 0/99

A toy rocket is launched from a platform on earth and flies straight up into the air.
Its height during the first 10 seconds after launching is given by: $s(t) = t^3 + 3t^2 + 4t + 100$, where s is measured in centimeters, and t is in seconds.
Find the velocity when the acceleration is 18 cm/s^2.

A. 2 cm/s

B. 44 cm/s

C. 13 cm/s

D. 28 cm/s

E. 16 cm/s

F. 32 cm/s

Tries 0/99

Find $\dfrac{dy}{dx}$ by implicit differentiation.

$$\ln(xy) + 2x = e^y$$

A. $\dfrac{dy}{dx} = \dfrac{-2-y}{x-e^y}$

B. $\dfrac{dy}{dx} = \dfrac{-2y}{1-ye^y}$

C. $\dfrac{dy}{dx} = \dfrac{1+2xy}{xye^y}$

D. $\dfrac{dy}{dx} = \dfrac{-2xy-y}{x-xye^y}$

E. $\dfrac{dy}{dx} = ye^y - \dfrac{y}{x} - 2y$

F. $\dfrac{dy}{dx} = \dfrac{-xy-y}{2x-xye^y}$

Tries 0/99

An airplane flies at an altitude of $y = 2$ miles straight towards a point directly over an observer. The speed of the plane is 500 miles per hour. Find the rate at which the observer's angle of elevation is changing when the angle is $\dfrac{\pi}{3}$.

A. $\dfrac{75}{4}$ radian per hour

B. $\dfrac{225}{8}$ radian per hour

C. $50\sqrt{3}$ radian per hour

D. $\dfrac{375}{2}$ radian per hour

E. $\dfrac{125\sqrt{3}}{2}$ radian per hour

F. $\dfrac{125}{2}$ radian per hour

Tries 0/99

Find the critical numbers of $y = x^2 e^x$.

A. -2 and 1

B. 0 and 2

C. -2 and 2

D. -2 and 0

E. 0 and 1

F. 1 and 2

Tries 0/99

Given $f(x) = \dfrac{2(3-x^2)}{\sqrt{3x^2+1}}$. Find $f'(1)$.

A. $-\dfrac{9}{4}$

B. $-\dfrac{1}{2}$

C. $-\dfrac{3}{4}$

D. $-\dfrac{7}{2}$

E. $-\dfrac{13}{6}$

F. $-\dfrac{3}{2}$

Tries 0/99

Find the largest open interval where $g(t)$ is increasing.

$$g(t) = -\frac{1}{3}t^3 + \frac{3}{2}t^2$$

A. $(-\infty, 0)$

B. $(3, \infty)$

C. $(0, \infty)$

D. $(0, 3)$

E. $(-\infty, 3)$

F. $(-\infty, 0) \cup (3, \infty)$

Tries 0/99

A spherical balloon is inflated with gas at a rate of 5 cubic centimeters per minute. How fast is the radius of the balloon changing at the instant when the radius is 4 centimeters?
The volume V of a sphere with a radius r is $V = \dfrac{4}{3}\pi r^3$.

A. $\dfrac{25}{4\pi}$ centimeters per minute

B. $\dfrac{5}{16\pi}$ centimeters per minute

C. $\dfrac{5}{4\pi}$ centimeters per minute

D. $\dfrac{5}{64\pi}$ centimeters per minute

E. $\dfrac{256\pi}{3}$ centimeters per minute

F. $\dfrac{5\pi}{64}$ centimeters per minute

Tries 0/99

Find $f'(2)$.

$$f(t) = \frac{2t-1}{(2t+1)^2}$$

A. $-\frac{2}{25}$

B. $\frac{22}{125}$

C. $\frac{4}{124}$

D. $-\frac{2}{125}$

E. $-\frac{1}{10}$

F. $\frac{2}{125}$

Tries 0/99

If $y = (\frac{2x-1}{2x+1})^3$, then $\frac{dy}{dx} =$

A. $\frac{48}{(2x+1)^4}$

B. $3(\frac{2x-1}{2x+1})^2$

C. $\frac{24x-12}{(2x+1)^3}$

D. $\frac{12(2x-1)^2}{(2x+1)^4}$

E. $\frac{6(2x-1)^2}{(2x+1)^3}$

F. $\frac{12(2x-1)^2}{(2x+1)^3}$

Tries 0/99

Given $f(x) = e^{5x} \ln(7x + e)$. Find $f'(0)$.

A. $1 + \frac{1}{e}$

B. $\frac{1}{e}$

C. $\frac{35}{e}$

D. $5 + \frac{7}{e}$

E. $\frac{5}{e}$

F. $1 + \frac{7}{e}$

Tries 0/99

The price of a commodity is given by $p(t) = (t^2 + 2t)^2 + 100000$, where $p(t)$ is the price in dollars and t is years after 2000. At what rate is the price changing in the year of 2010?

A. \$5280/year

B. \$1680/year

C. \$2400/year

D. \$4800/year

E. \$2640/year

F. \$900/year

Tries 0/99

Find $g'(x)$ if $g(x) = \tan^2(3x^2 + 2)$.

A. $12x \tan(3x^2 + 2) \sec^2(3x^2 + 2)$

B. $12x \sec^2(3x^2 + 2)$

C. $2 \sec^2(6x)$

D. $2 \tan(6x)$

E. $6x \tan(3x^2 + 2) \sec^2(3x^2 + 2)$

F. $12x \tan(3x^2 + 2)$

Tries 0/99

Use implicit differentiation to find $\frac{dy}{dx}$ if $x^2 + y^2 = 2xy + 5$.

A. 1

B. $\frac{x}{x-y}$

C. $\frac{x}{1-y}$

D. 0

E. $\dfrac{2x - 2y - 5}{2x - 2y}$

F. $\dfrac{2y - 2x + 5}{2y - 2x}$

Tries 0/99

All edges of a cube are expanding at a rate of 2 centimeters per second. How fast is the surface area changing when each edge is 3 centimeters?

A. 72 cm^2/sec

B. 36 cm^2/sec

C. 46 cm^2/sec

D. 12 cm^2/sec

E. 48 cm^2/sec

F. 54 cm^2/sec

Tries 0/99

Water flows into a right cylindrical shaped swimming pool with a circular base at a rate 4 m^3/min. The radius of the base is 3 m. How fast is the water level rising inside the swimming pool? The volume of a right cylinder with a circular base is $V = \pi r^2 h$, where r is the radius of the base and h is the height of the cylinder.

A. $\frac{4}{9\pi}$ m/min

B. $\frac{3}{8\pi}$ m/min

C. $\frac{2}{3\pi}$ m/min

D. $\frac{3}{16\pi}$ m/min

E. $\frac{2}{9\pi}$ m/min

F. $\frac{4}{3\pi}$ m/min

Tries 0/99

A 10-ft ladder, whose base is sitting on level ground, is leaning at an angle against a vertical wall when its base starts to slide away from the vertical wall. When the base of the ladder is 6 ft away from the bottom of the vertical wall, the base is sliding away at a rate of 4 ft/sec. At what rate is the vertical distance from the top of the ladder to the ground changing at this moment?

A. –3 ft/sec

B. 4 ft/sec

C. $\frac{1}{4}$ ft/sec

D. $-\frac{3}{4}$ ft/sec

E. $-\frac{1}{3}$ ft/sec

F. 8 ft/sec

Tries 0/99

Given $f(x) = \sin^3(2x)$, find $f'(\frac{\pi}{12})$.

A. $\frac{3\sqrt{3}}{4}$

B. $-\frac{3\sqrt{3}}{8}$

C. $\frac{3}{2}$

D. $\frac{9}{4}$

E. $-\frac{\sqrt{3}}{4}$

F. $\frac{1}{2}$

Tries 0/99

Given $f(x) = \ln \sqrt[3]{\frac{3+3x}{3-x}}$, find $f'(1)$.

A. $\frac{1}{3}$

B. $\frac{1}{8}$

C. $\frac{1}{6}$

D. $\frac{1}{2}$

E. $\frac{1}{4}$

F. $\frac{2}{3}$

Tries 0/99

Use implicit differentiation to find the equation of the tangent line to the graph at $(-2, 2)$.

$$x^2 + xy = 4 - y^2$$

A. $y = x + 4$

B. $y = -x$

C. $y = -x + 2$

D. $y = 2$

E. $y = -x + 4$

F. $y = x + 2$

Tries 0/99

Find $\frac{dy}{dx}$ by implicit differentiation.

$$e^{xy} = 8x - 8y$$

A. $\frac{dy}{dx} = \dfrac{8 - ye^{xy}}{8 + xe^{xy}}$

B. $\frac{dy}{dx} = \dfrac{8 - xe^{xy}}{8 + ye^{xy}}$

C. $\frac{dy}{dx} = \dfrac{8}{8 - xe^{xy}}$

D. $\frac{dy}{dx} = \dfrac{8}{8 + xe^{xy}}$

E. $\frac{dy}{dx} = \dfrac{8 + xe^{xy}}{8 - ye^{xy}}$

F. $\frac{dy}{dx} = \dfrac{8 + ye^{xy}}{8 - xe^{xy}}$

Tries 0/99

The position of an object moving on a straight line is given by $s(t) = 48 - 3t - 2t^2 - 6t^3$, where t is in minutes and $s(t)$ is in meters. What is the acceleration when $t = 3$ minutes?

A. -114 m/min^2

B. -108 m/min^2

C. -177 m/min^2

D. -76 m/min^2

E. -112 m/min^2

F. -110 m/min^2

Tries 0/99

The sides of an equilateral triangle are expanding at a rate of 2 cm per minute. Find the rate of change of the area when the length of each side is 3 cm. Use the fact that the area of an equilateral triangle is $A = \frac{\sqrt{3}}{4}x^2$, where x is the length of a side.

A. $\sqrt{3}$ cm^2/min

B. $\frac{9\sqrt{3}}{2}$ cm^2/min

C. $\frac{3\sqrt{3}}{2}$ cm^2/min

D. $\frac{9\sqrt{3}}{4}$ cm^2/min

E. $3\sqrt{3}$ cm^2/min

F. $\frac{3\sqrt{3}}{4}$ cm^2/min

Tries 0/99

Given $f(x) = \dfrac{x^3}{3} + x + \sqrt{x^3}$. Find $f''(4)$.

A. $\frac{49}{8}$

B. $\frac{26}{3}$

C. $\frac{49}{6}$

D. $\frac{35}{4}$

E. $\frac{67}{8}$

F. $\frac{19}{2}$

Tries 0/99

Given $y = x \ln x$, find $y''(e)$.

A. $e + 1$

B. e

C. 2

D. 0

E. $\frac{1}{e}$

F. $\frac{1}{e} + 1$

Tries 0/99

Find the relative extrema of $g(x) = \dfrac{x}{x^2 + 9}$.

A. Relative maximum at $x = 3$; Relative minimum at $x = -\sqrt{3}$

B. Relative maximum at $x = -3$; Relative minimum at $x = 3$

C. Relative maximum at $x = -\sqrt{3}$; Relative minimum at $x = \sqrt{3}$

D. Relative maximum at $x = -3$; Relative minimum at $x = \sqrt{3}$

E. Relative maximum at $x = 3$; Relative minimum at $x = -3$

F. Relative maximum at $x = \sqrt{3}$; Relative minimum at $x = -\sqrt{3}$

Tries 0/99

Find the largest open interval(s) on which

$$f(x) = (3x - 4)(x + 2)$$

is increasing.

A. $(-\infty, 3)$

B. $(-\infty, -2)$ and $(\frac{4}{3}, \infty)$

C. $(-\infty, 3)$ and $(3, \infty)$

D. $(-\frac{1}{3}, \infty)$

E. $(-2, \frac{4}{3})$

Tries 0/99

If x and y are both functions of t and

$$x + y^2 = 4e^x,$$

find $\frac{dy}{dt}$ when $\frac{dx}{dt} = 2$, $x = 0$, and $y = -2$.

A. -1

B. $-\frac{1}{2}$

C. 1

D. 0

E. $-\frac{3}{2}$

F. 3

Tries 0/99

Find $g'(1)$.

$$g(x) = \left(\frac{x^2}{x+2}\right)^3$$

A. $\frac{5}{3}$

B. $\frac{1}{3}$

C. $\frac{5}{9}$

D. $\frac{25}{3}$

E. $\frac{5}{27}$

F. $\frac{25}{27}$

Tries 0/99

The position of a particle on a straight line t seconds after it starts moving is $s(t) = 2t^3 - 3t^2 + 6t + 1$ feet. Find the acceleration of the particle when its velocity is 78 ft/sec.

A. 84 ft/sec^2

B. 105 ft/sec^2

C. 30 ft/sec^2

D. 258 ft/sec^2

E. 42 ft/sec^2

F. 46 ft/sec^2

Tries 0/99

Find the relative maximum of $f(x) = 2x^3 - 6x$.

A. $(1, 4)$

B. $(0, 0)$

C. $(-1, 0)$

D. $(1, 0)$

E. $(-1, 4)$

F. $(1, -4)$

Tries 0/99

Given that

$$y^2x - x^2 = y\ln(x) + 3,$$

use implicit differentiation to find $\frac{dy}{dx}$ at $(1, -2)$.

A. 5

B. $-\frac{2}{5}$

C. 1

D. -1

E. -2

F. 2

Tries 0/99

Find $f'(4)$ if $f(x) = (x^2 + 3)\sqrt{x^2 - 7}$.

A. $\frac{163}{6}$

B. $\frac{110}{3}$

C. $\frac{148}{3}$

D. $\frac{142}{3}$

E. $\frac{4}{3}$

F. $\frac{32}{3}$

Tries 0/99

Find the x value at which the function $f(x) = x^3 - 9x^2 - 120x + 3$ has a relative minimum.

A. $x = 4$

B. $x = -10$

C. $x = 10$

D. $x = -3$

E. $x = -4$

F. $x = 3$

Tries 0/99

Which of the following is a critical number of

$$y = \frac{1}{3}\sin(3x) - \frac{x}{2}?$$

A. 0

B. $\frac{\pi}{3}$

C. $\frac{\pi}{9}$

D. $\frac{\pi}{12}$

E. $\frac{\pi}{18}$

F. $\frac{\pi}{6}$

Tries 0/99

An observer stands 400 feet away from the point where a hot air balloon is launched. If the balloon ascends vertically at a (constant) rate of 30 feet per second, how fast is the balloon moving away from the observer 10 seconds after it is launched?

A. 40 ft/sec

B. 50 ft/sec

C. 18 ft/sec

D. 30 ft/sec

E. 24 ft/sec

F. 37.5 ft/sec

Tries 0/99

A spherical snowball grows in size as it rolls down a snow covered hill. If the volume of the snowball is increasing at a rate of 1 cubic inch per second, at what rate, in inches per second, is the radius of the snowball increasing when the radius is 3 inches? (Recall that the volume of a sphere is given by $V = \frac{4}{3}\pi r^3$.)

A. 1

B. 9

C. $\frac{1}{36\pi}$

D. $\frac{1}{9\pi}$

E. $\frac{1}{4\pi}$

F. 0

Tries 0/99

Find the second derivative of $f(x) = \ln(4x) + e^{x^2}$.

A. $f''(x) = -\frac{1}{x^2} + 4x^2 e^{x^2}$

B. $f''(x) = -\frac{1}{4x^2} + e^{x^2}(4x^2 + 2)$

C. $f''(x) = -\frac{1}{x^2} + e^{x^2}(4x^2 + 2)$

D. $f''(x) = -\frac{1}{x^2} + 2e^{x^2}$

E. $f''(x) = -\frac{1}{4x^2} + 4x^2 e^{x^2}$

F. $f''(x) = -\frac{1}{4x^2} + 2e^{x^2}$

Tries 0/99

Find the open interval where the function $f(x) = \frac{1}{3}x^3 - 3x^2 + 5x - 7$ is concave down.

A. $(5, \infty)$

B. $(1, \infty)$

C. $(3, \infty)$

D. $(1, 5)$

E. $(-\infty, 3)$

F. $(-\infty, 1)$

Tries 0/99

Find the x-coordinate of the inflection point of $y = e^{2x} - 8x^2$.

A. $x = \ln 4$

B. $x = 2 \ln 4$

C. $x = e^2$

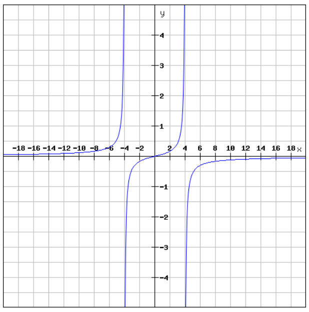
D. $x = e$

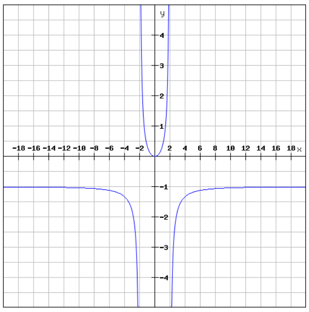
E. $x = \frac{1}{2} \ln 4$

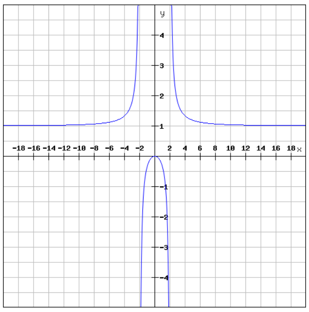
F. $x = 0$

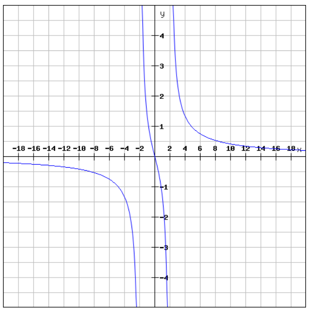
Tries 0/99

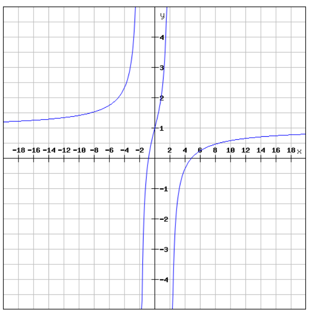
Given the function $f(x) = \dfrac{4x}{x^2-4}$ with its first and second derivatives $f'(x) = \dfrac{-4(x^2+4)}{(x^2-4)^2}$ and $f''(x) = \dfrac{8x(x^2+12)}{(x^2-4)^3}$. Find the graph of $f(x)$.

A. 

B. 

C. 

D. 

E. 

Tries 0/99

Let $f(x)$ be a polynomial whose derivative is always increasing. Choose the correct statement(s).

[I.] $f(x)$ has an inflection point.

[II.]$f(x)$ has a relative maximum.

[III.] $f(x)$ is always concave up.

A. Only I is correct.

B. Only II is correct.

C. Only III is correct.

D. I and II are correct.

E. II and III are correct.

F. I and III are correct.

Tries 0/99

Which of the following limits equals to $-\infty$?

A. $\lim_{x\to\infty} \frac{x^3-1}{x^2+1}$

B. $\lim_{x\to-\infty} \frac{2x^2}{x^2+2}$

C. $\lim_{x\to\infty} \left(\frac{2}{x} - \frac{x}{6}\right)$

D. $\lim_{x\to\infty} \frac{-x^3+2x^2-3x}{3x^4-5x^3+1}$

E. $\lim_{x\to-\infty} \frac{1-x^2}{x-1}$

F. $\lim_{x\to\infty} \frac{x-1}{x^3-1}$

Tries 0/99

Consider the function $f(x) = \dfrac{x^2+3x+2}{x^2-1}$. Which of the statements are true?

[I.] f has a vertical asymptote at $x = 1$.

[II.] f has a horizontal asymptote at $y = 0$.

[III.] f has a vertical asymptote at $x = -1$.

[IV.] f has a horizontal asymptote at $y = 1$.

A. II and IV

B. I and II

C. I and IV

D. II and III

E. I and III

F. III and IV

Tries 0/99

An open-top box with a square base is made using 48 ft^2 of material. Find the maximum possible volume of this box.

A. 96 ft^3

B. 16 ft^3

C. 32 ft^3

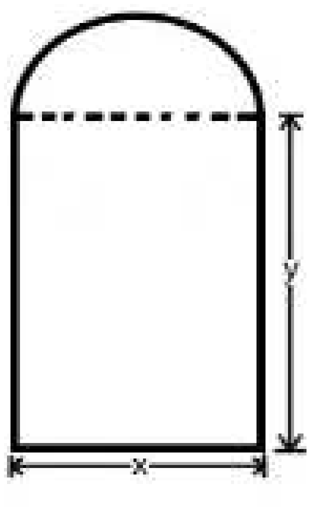
D. 64 ft^3

E. 48 ft^3

F. 80 ft^3

Tries 0/99

Norman window is constructed by adjoining a semicircle to the top of an ordinary rectangular window. See figure below. Find x which maximizes the area of this window if the total perimeter is 10 feet.



A. $\dfrac{20}{\pi}$ ft

B. $\dfrac{10}{(\pi+2)^2}$ ft

C. $\dfrac{20}{\pi+4}$ ft

D. $\dfrac{10}{\pi}$ ft

E. $\dfrac{20}{(\pi+4)^2}$ ft

F. $\dfrac{20}{\pi+2}$ ft

Tries 0/99

Find the x-coordinate of the point on the graph of $y = \sqrt{x} + 2$ that is the closest to the point $(3, 2)$.

A. $\frac{9}{2}$

B. 0

C. $\frac{5}{2}$

D. $\frac{3}{2}$

E. $\frac{1}{2}$

F. $\frac{7}{2}$

Tries 0/99

SheSellsSeaShells is an ocean boutique offering shells and handmade shell crafts on Sanibel Island in Florida. Find the price SheSellsSeaShells should charge to maximize revenue if $p(x) = 160 - 2x$, where $p(x)$ is the price in dollars at which x shells will be sold per day.

A. \$120

B. \$20

C. \$80

D. \$60

E. \$40

F. \$100

Tries 0/99

Find the open interval where $f(x) = \frac{1}{2}x^4 + 2x^3$ is concave downward.

A. $(-3, \infty)$

B. $(-\infty, -3)$

C. $(-2, 0)$

D. $(-3, 0)$

E. $(-2, \infty)$

F. $(-3, -2)$

Tries 0/99

Let $f(x) = -x^3 + 12x$. The y values of the absolute minimum and the absolute maximum of $f(x)$ over the closed interval $[-3, 5]$ are respectively:

A. -65 and -16

B. -65 and -9

C. -65 and 16

D. -16 and 16

E. -16 and -9

F. -9 and 16

Tries 0/99

$\lim_{x \to \infty} f(x) = \infty$ is true for which of the following functions?

A. $f(x) = \dfrac{2x^2}{x^2 + x}$

B. $f(x) = \dfrac{2x^3 + x^2 - 2}{-3x^3 + 7}$

C. $f(x) = \dfrac{x - x^2}{-x + 5}$

D. $f(x) = \dfrac{x + 9}{x^2 + x + 6}$

E. $f(x) = \dfrac{2}{x} + 3$

F. $f(x) = \dfrac{x^3 + x^2 - 2}{-x + 5}$

Tries 0/99

Choose the correct statement regarding the asymptotes of $f(x)$.

$f(x) = \dfrac{x^2 - 2x + 6}{x + 1}$

A. Horizontal Asymptote: $y = 0$; Vertical Asymptote: $x = -1$; Slant Asymptote: None

B. Horizontal Asymptote: None; Vertical Asymptote: $x = -1$; Slant Asymptote: None

C. Horizontal Asymptote: $y = -1$; Vertical Asymptote: $x = 1$; Slant Asymptote: None

D. Horizontal Asymptote: $y = 0$; Vertical Asymptote: $x = 1$; Slant Asymptote: $y = x - 3$

E. Horizontal Asymptote: $y = -1$; Vertical Asymptote: $x = 1$; Slant Asymptote: $y = x - 3$

F. Horizontal Asymptote: None; Vertical Asymptote: $x = -1$; Slant Asymptote: $y = x - 3$

Tries 0/99

Find the point on the graph of $y = 5x + 2$ that is the closest to the point (0,4).

A. $(\frac{5}{13}, \frac{51}{26})$

B. $(\frac{10}{13}, \frac{102}{13})$

C. $(\frac{5}{26}, \frac{51}{13})$

D. $(\frac{10}{13}, \frac{51}{13})$

E. $(\frac{5}{13}, \frac{102}{13})$

F. $(\frac{5}{13}, \frac{51}{13})$

Tries 0/99

$f(x)$ is a polynomial and

$$f'(2) = 0, \qquad f'(5) = 0$$

$$f''(3.5) = 0,\ f''(x) < 0 \text{ on } (-\infty, 3.5) \text{ and } f''(x) > 0 \text{ on } (3.5, \infty)$$

Which of the following statements are true?

I. $(2, f(2))$ is an inflection point of $f(x)$.

II. $(3.5, f(3.5))$ is an inflection point of $f(x)$.

III. $f(x)$ has a relative maximum at $x = 2$.

IV. $f(x)$ has a relative minimum at $x = 5$.

A. Only I and IV are true.

B. Only II and III are true.

C. Only I and III are true.

D. Only II and IV are true.

E. Only I, II and IV are true.

F. Only II, III and IV are true.

Tries 0/99

$$\int \frac{\sin x - 2\cos x}{4} \mathrm{d}x =$$

A. $\dfrac{2\sin x - \cos x}{4} + C$

B. $\dfrac{-\sin x + 2\cos x}{4} + C$

C. $\dfrac{2\sin x + \cos x}{4} + C$

D. $\dfrac{\sin x + 2\cos x}{4} + C$

E. $\dfrac{-2\sin x + 2\cos x}{4} + C$

F. $\dfrac{-2\sin x - \cos x}{4} + C$

Tries 0/99

An evergreen nursery usually sells a certain shrub after 5 years of growth and shaping. The growth rate during those 5 years is approximated by

$$\frac{\mathrm{d}h}{\mathrm{d}t} = 1.4t + 8,$$

where t is the time in years and h is the height in centimeters. The seedlings are 14 centimeters tall when planted. How tall are the shrubs when they are sold?

A. 36 cm

B. 57.5 cm

C. 29 cm

D. 42 cm

E. 92.5 cm

F. 71.5 cm

Tries 0/99

A company's marketing department has determined that if their product is sold at the price of p dollars per unit, they can sell $q = 2800 - 200p$ units. Each unit costs \$10 to make. What is the maximum profit that the company can make?

A. 980 dollars

B. 1000 dollars

C. 600 dollars

D. 880 dollars

E. 1200 dollars

F. 800 dollars

Tries 0/99

Find the absolute extrema of $f(x) = 2x^3 + 3x^2 - 36x$ on the closed interval $[0, 4]$.

A. absolute minimum: $(0, 0)$; absolute maximum: $(4, 32)$

B. absolute minimum: $(-3, 0)$; absolute maximum: $(2, 0)$

C. absolute minimum: $(2, -44)$; absolute maximum: $(0, 0)$

D. absolute minimum: $(-3, 0)$; absolute maximum: $(0, 0)$

E. absolute minimum: $(2, -44)$; absolute maximum: $(-3, 81)$

F. absolute minimum: $(2, -44)$; absolute maximum: $(4, 32)$

Tries 0/99

A rectangular plot of farmland will be bounded on one side by a river and on the other three sides by a single-strand electric fence. With 160 m of wire at your disposal, what is the **largest area** you can enclose?

A. $6400\,\mathrm{m}^2$

B. $4800\,\mathrm{m}^2$

C. $1600\,\mathrm{m}^2$

D. $3600\,\mathrm{m}^2$

E. $4000\,\mathrm{m}^2$

F. $3200\,\mathrm{m}^2$

Tries 0/99

A rectangular box with square base and top is to be constructed using sturdy metal. The volume is to be 16 m^3. The material used for the sides costs \$4 per square meter, and the material used for the top and bottom costs \$1 per square meter. What is the least amount of money that can be spent to construct the box?

A. \$55

B. \$136

C. \$30

D. \$120

E. \$160

F. \$96

Tries 0/99

Choose the correct statement(s) about the function $f(x) = 2x^3 - 9x^2$.

[I.] $f(x)$ has a relative maximum at $x = 0$.

[II.] $f(x)$ has a relative minimum at $x = 3$.

[III.] $f(x)$ is concave downward on $(-\infty, \frac{3}{2})$.

A. I only

B. II only

C. I & III only

D. II & III only

E. All of the statements are true.

F. I & II only

Tries 0/99

Find the point of inflection of $h(x) = xe^{-2x}$.

A. $\left(-\frac{1}{2}, -\frac{e}{2}\right)$

B. $(0, 0)$

C. $\left(-1, -e^2\right)$

D. $\left(\frac{1}{2}, \frac{e}{2}\right)$

E. $\left(\frac{1}{2}, \frac{1}{2e}\right)$

F. $\left(1, \frac{1}{e^2}\right)$

Tries 0/99

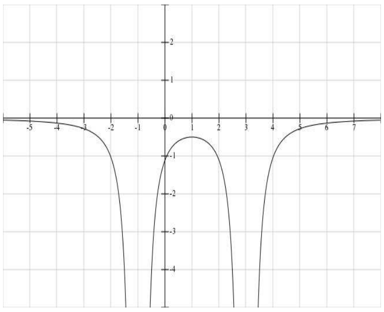
A function $f(x)$ satisfies the following conditions:

$f'(x) > 0$ on $(-\infty, -1)$

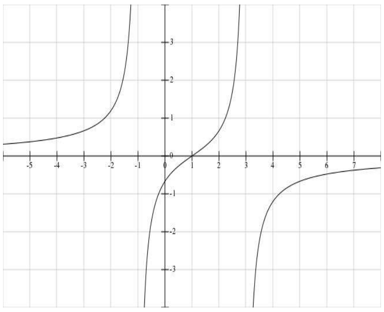
$f''(x) < 0$ on $(-1, 0)$

$f'(x) = 0$ at $x = 1$

Which of the following graphs is a possible graph of $f(x)$?



A.



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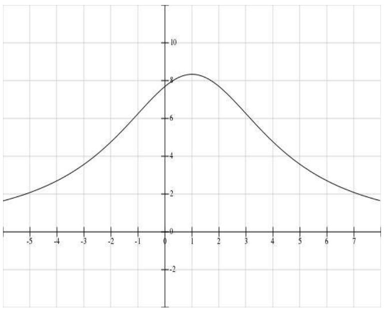
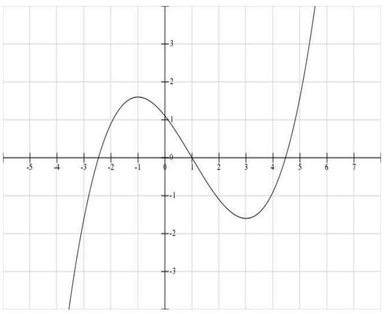


C.



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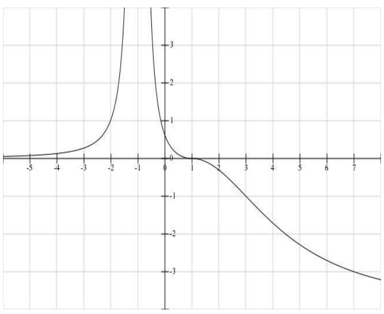


E.

Tries 0/99

Which of the following functions satisfies $\lim_{x\to\infty} f(x) = -\infty$?

A. $f(x) = \dfrac{2x-5}{x^2+25}$

B. $f(x) = \dfrac{x^2-3x}{x-5x^2}$

C. $f(x) = \dfrac{x^2-10}{2x^3+x}$

D. $f(x) = \dfrac{x^3-27x}{7-4x^2}$

E. $f(x) = \dfrac{x^4-16}{6x+2}$

F. $f(x) = \dfrac{6}{x} + 3$

Tries 0/99

Which of the following describes all the asymptotes of the function $f(x) = \dfrac{-2x^2-5x+7}{x+3}$?

A. $x = 3, y = 0$

B. $x = -2, y = 0$

C. $x = 3, y = -2$

D. $x = -3, y = -2x+1$

E. $x = -3, y = -2$

F. $x = -2, y = 2x+1$

Tries 0/99

A box with a square base and open top is to be made from 300 square inches of material. What is the volume of the largest box that can be made.

A. 600 cubic inches

B. 560 cubic inches

C. 400 cubic inches

D. 500 cubic inches

E. 472 cubic inches

F. 532 cubic inches

Tries 0/99

A poster is to have an area of 200 square inches with 1 inch margins on the left and right sides, and 2 inch margins on the top and bottom. Varying the dimensions of the poster changes the area of the region inside the margins. What is the maximum area inside the margins?

A. 168 square inches

B. 148 square inches

C. 138 square inches

D. 128 square inches

E. 88 square inches

F. 108 square inches

Tries 0/99

Find the x-coordinate of the point on the line of $y = 2x + 1$ that is closest to the point (5,1).

A. 4

B. 3

C. 5

D. 1

E. 0

F. 2

Tries 0/99

$\int \frac{3x^2 - 4}{2\sqrt{x}} dx =$

A. $\frac{3}{7}\sqrt{x^7} - \frac{4}{3}\sqrt{x^3} + C$

B. $\frac{9}{4}\sqrt{x} + \frac{1}{\sqrt{x^3}} + C$

C. $\frac{3}{5}\sqrt{x^3} - \frac{4}{3}\sqrt{x} + C$

D. $\frac{3}{5}\sqrt{x^5} - 4\sqrt{x} + C$

E. $\frac{3}{4}\sqrt{x^3} - \frac{3}{\sqrt{x}} + C$

F. $\frac{9}{4}\sqrt{x^5} + \sqrt{x} + C$

Tries 0/99

Find the particular solution that satisfies the following differential equation and the initial conditions.

$$f''(x) = 3\cos(x), \quad f'(0) = 4, \quad f(0) = 7$$

A. $f(x) = 3\cos(x) + x + 7$

B. $f(x) = 3\cos(x) + 4x + 10$

C. $f(x) = -3\cos(x) + x + 7$

D. $f(x) = -3\cos(x) + 4x + 10$

E. $f(x) = -3\cos(x) + 4x + 7$

F. $f(x) = 3\cos(x) + 4x + 7$

Tries 0/99

Find the inflection point of $y = x^3 + 3x^2$.

A. $(-1, 0)$

B. $(0, 0)$

C. $(0, 2)$

D. $(-1, 2)$

E. $(-2, 4)$

F. $(-2, 0)$

Tries 0/99

A particle is moving on a straight line with an initial velocity of 10 ft/sec and an acceleration of

$$a(t) = \sqrt{t} + 2,$$

where t is time in seconds and $a(t)$ is in ft/sec^2. What is its velocity after 9 seconds?

A. 24 ft/sec

B. 135 ft/sec

C. 72 ft/sec

D. 46 ft/sec

E. 90 ft/sec

F. 140 ft/sec

Tries 0/99

Which of the following limits equals $-\infty$?

A. $\lim\limits_{x\to-\infty} \dfrac{x^3+5x^2-7x}{-2x^2-5x+6}$

B. $\lim\limits_{x\to-\infty} \dfrac{-x^3+8}{x^2+x-2}$

C. $\lim\limits_{x\to-\infty} \dfrac{-2x^2+7x}{x^3+5x^2+1}$

D. $\lim\limits_{x\to-\infty} \dfrac{x^4+8x}{x^3+1}$

E. $\lim\limits_{x\to-\infty} \dfrac{x^2-4}{x^2+1}$

F. $\lim\limits_{x\to-\infty} \dfrac{x^2+4x-5}{x^4-1}$

Tries 0/99

Choose the correct statement regarding the y values of the absolute maximum and the absolute minimum of $f(x) = x^3-3x+10$ on the interval of $[0,3]$.

A. The y values of the absolute maximum and the absolute minimum are 28 and 10 respectively.

B. The y values of the absolute maximum and the absolute minimum are 28 and 8 respectively.

C. The y values of the absolute maximum and the absolute minimum are 12 and 12 respectively.

D. The y values of the absolute maximum and the absolute minimum are 12 and 8 respectively.

E. The y values of the absolute maximum and the absolute minimum are 28 and 12 respectively.

F. The y values of the absolute maximum and the absolute minimum are 12 and 10 respectively.

Tries 0/99

Which of the following statements is true regarding the function $f(x) = \dfrac{2x^2 - 3x + 4}{x - 1}$?

A. $f(x)$ has a slant asymptote which is $y = x - 1$.

B. $f(x)$ has a slant asymptote which is $y = 2x - 1$.

C. $f(x)$ has a slant asymptote which is $y = x + 1$.

D. $f(x)$ has a horizontal asymptote which is $y = 2$.

E. $f(x)$ has a horizontal asymptote which is $y = 3$.

F. $f(x)$ has a horizontal asymptote which is $y = \frac{1}{2}$.

Tries 0/99

Find the x values at which the inflection points of $f(x) = \frac{1}{4}x^4 + \frac{2}{3}x^3 - \frac{15}{2}x^2 + 7$ occur.

A. $x = 0$ and $x = 3$

B. $x = -3$ and $x = \frac{5}{3}$

C. $x = -3$ and $x = 0$

D. $x = -5$ and $x = -3$

E. $x = -5$ and $x = 3$

F. $x = 0$ and $x = \frac{5}{3}$

Tries 0/99

Find the largest open interval(s) where $f(x) = 4x^5 - 5x^4$ is concave upward.

A. $(-\infty, 0)$ and $(1, \infty)$

B. $(\frac{3}{4}, \infty)$

C. $(-\infty, \frac{3}{4})$ and $(1, \infty)$

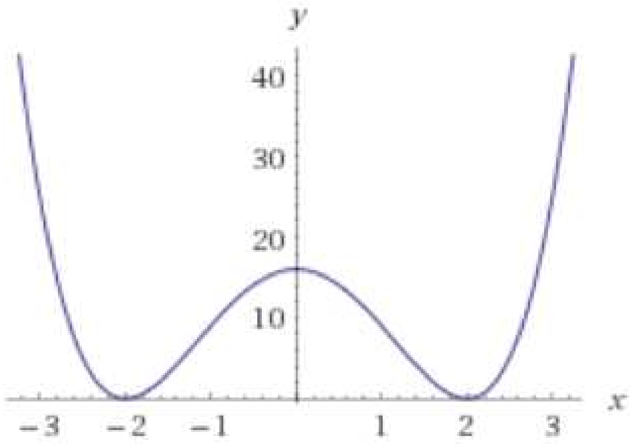
D. $(-\infty, 0)$ and $(\frac{3}{4}, \infty)$

E. $(0, \infty)$

F. $(-\infty, \frac{3}{4})$

Tries 0/99

The following graph is of $f'(x)$. Choose the correct statement(s) about $f(x)$.



I. On $(-2, 2)$, $f(x)$ is increasing.

II. On $(-\infty, -2)$, $f(x)$ is concave up.

III. $f(x)$ has a relative maximum at $x = 0$.

A. I, II only

B. I only

C. I, III only

D. II, III only

E. II only

F. III only

Tries 0/99

Evaluate the indefinite integral $\int \sec x(\tan x - \sec x)\ dx$.

A. $\sec x + \tan x + C$

B. $\sec x - \tan x + C$

C. $-\sec x + \tan x + C$

D. $\sec x + \cot x + C$

E. $\csc x + \tan x + C$

F. $-\sec x - \tan x + C$

Tries 0/99

Solve the following initial value problem

$$y' = \frac{1}{x^2} + x, \qquad y(2) = 1$$

A. $y = -\frac{2}{x^3} + 4$

B. $y = -\frac{1}{x} + \frac{x^2}{2} - \frac{1}{2}$

C. $y = -\frac{1}{x} + \frac{x^2}{2} + \frac{1}{2}$

D. $y = -\frac{2}{x^3} + \frac{x^2}{2} + \frac{7}{2}$

E. $y = -\frac{2}{x^3} + \frac{x^2}{2} - \frac{3}{4}$

F. $y = -\frac{1}{x} + \frac{x^2}{2} + \frac{5}{2}$

Tries 0/99

Solve the initial value problem $y'' = 2 + 4e^x$ with $y'(0) = 1$ and $y(0) = 4$.

A. $y = 8e^{2x}$

B. $y = x^2 + 4e^x - 3x$

C. $y = 8e^{2x} + 2x$

D. $y = x^2 + 4e^x - 4x + 3$

E. $y = x^2 + 4e^x - 4$

F. $y = x^2 + 4e^x - 3x - 4$

Tries 0/99

A family wants to fence a rectangular play area alongside the wall of their house. The wall of their house bounds one side of the play area. If they want the play area to be exactly 2500 ft^2, what is the least amount of fencing needed? Round your answer to the nearest tenth place.

A. 70.7 ft

B. 141.4 ft

C. 93.3 ft

D. 212.1 ft

E. 106.1 ft

F. 186.6 ft

Tries 0/99

A box with a square base and an open top must have a volume of 4000 cm^3. If the cost of the material used is $1 per cm^2, the smallest possible cost of the box is

A. $500

B. $1200

C. $1500

D. $1000

E. $600

F. $2000

Tries 0/99

$\boxed{9\ pt}$ Which of the following is NOT equal to $-\infty$?

1.A◯ $\displaystyle\lim_{x\to 8^-} \frac{4}{(x-8)^5}$

B◯ $\displaystyle\lim_{x\to 3^-} \frac{1}{x-3}$

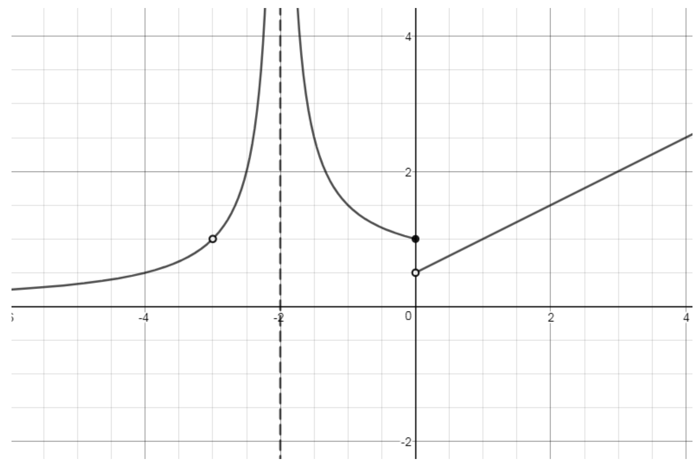
C◯ $\displaystyle\lim_{x\to 2^+} \frac{-1}{\sqrt{x-2}}$

D◯ $\displaystyle\lim_{x\to 8^+} \frac{4}{(x-8)^5}$

E◯ $\displaystyle\lim_{x\to 4^-} \frac{-1}{(4-x)^2}$

F◯ $\displaystyle\lim_{x\to 1^+} \frac{x}{1-x}$

$\boxed{9\ pt}$ Choose the correct statement(s) regarding $f(x)$ shown in the graph below.



(a) $f(0) = \frac{1}{2}$

(b) $\displaystyle\lim_{x\to -3} f(x)$ does not exist.

(c) f is discontinuous at $x = -3$, $x = -2$ and $x = 0$.

(d) $\displaystyle\lim_{x\to 0^-} f(x) = 1$

2.A◯ a and c only

B◯ All statements are true.

C◯ d only

D◯ b only

E◯ c and d only

F◯ b and d only

$\boxed{8\ pt}$ Compute the following limit:

$$\lim_{x\to 2} \frac{x^2-2x}{x^2-5x+6}$$

3.A◯ 6

B◯ -2

C◯ -6

D◯ 0

E◯ -3

F◯ 2

$\boxed{8\ pt}$ Given

$$f(x) = \begin{cases} x^2-3, & x<1 \\ -\frac{1}{4}x+1, & x\geq 1 \end{cases}$$

Find $\lim_{x\to 1^+} f(x)$.

4.A◯ $\frac{3}{4}$

B◯ Does not exist.

C◯ 0

D◯ -2

E◯ 1

F◯ 1.75

$\boxed{8\ pt}$ Given $f(x) = \dfrac{x^2-36}{x^2-7x+6}$. Which of the following are true?

I. There is a hole at $x=6$.

II. There is a hole at $x=1$.

III. There is a hole at $x=-6$.

IV. There is a vertical asymptote at $x=6$.

V. There is a vertical asymptote at $x=1$.

VI. There is a vertical asymptote at $x=-6$.

5.A◯ II and III

B◯ II and IV

C◯ IV and V

D◯ I and VI

E◯ I and II

F◯ I and V

$\boxed{8\ pt}$ Find the derivative of $y=\frac{x}{10}+9x^4-\frac{1}{4}\sqrt{x}$.

6.A◯ $\frac{x}{10}+9x^3-\frac{\sqrt{x^3}}{8}$

B◯ $\frac{1}{10}+36x^3-\frac{\sqrt{x^3}}{8}$

C◯ $\frac{x}{10}+9x^3-\frac{1}{8\sqrt{x}}$

D◯ $\frac{1}{10}+36x^3-\frac{1}{8\sqrt{x}}$

E◯ $\frac{1}{10}+9x^3-\frac{1}{4\sqrt{x}}$

F◯ $\frac{x}{10}+36x^3-\frac{1}{4\sqrt{x}}$

$\boxed{8\ pt}$ The derivative of a function is found by computing $f'(x) = \lim_{h\to 0} \frac{\frac{4}{7(x+h)^3} - \frac{4}{7x^3}}{h}$. Which of the following could be $f(x)$?

7.A◯ $f(x) = \frac{4}{7x^3} + \frac{4}{7x}$

B◯ $f(x) = \frac{4}{7x^3}$

C◯ $f(x) = \frac{4x^3}{7}$

D◯ $f(x) = \frac{4}{7x}$

E◯ $f(x) = \frac{4}{7x^3} - \frac{4}{7x}$

F◯ $f(x) = \frac{1}{x^3}$

$\boxed{8\ pt}$ $s(t) = -5t^2 + 4t + 7$ describes the position, in meters, of a moving particle on a straight line in terms of time t, in hours. At what time does the particle stop?

8.A◯ $t = \frac{2}{5}$ hours

B◯ $t = \frac{4}{5}$ hours

C◯ $t = \frac{1}{10}$ hours

D◯ $t = 1$ hours

E◯ $t = 2$ hours

F◯ $t = 4$ hours

$\boxed{8\ pt}$ The population of a city since 1990 can be modeled as

$$P(t) = t^2 + 1234t + 26000,$$

where $t = 0$ corresponds to the year 1990. In which year is the population increasing at the rate of 1306 people per year?

9.A◯ 2017

B◯ 1995

C◯ 2036

D◯ 3260

E◯ 2043

F◯ 2026

$\boxed{8\ pt}$ Find the equation of the tangent line to $f(x) = 6x + \cos x$ at $x = \pi$.

10.A◯ $y = 6x + 12\pi - 1$

B◯ $y = 6x - 1$

C◯ $y = 6x - 6\pi$

D◯ $y = 6x + 6\pi - 1$

E◯ $y = 6x + 1$

F◯ $y = 6x$

$\boxed{9\ pt}$ Given $g(t) = \dfrac{2\sqrt{t} - 5}{t - 1}$, find $g'(4)$.

11.A◯ $-\frac{1}{3}$

B◯ $\frac{45}{2}$

C◯ $\frac{5}{\sqrt{2}-2}$

D◯ $\frac{5}{18}$

E◯ $\frac{5}{6}$

F◯ 0

9 pt Find the derivative of $f(x) = (e^x + 5)\sec x$.

12.A◯ $e^x \sec^2 x + e^x \sec x + 5\sec^2 x$

B◯ $e^x \sec x \tan x + e^x \sec x + 5\sec x \tan x$

C◯ $-e^x \sec x \tan x + e^x \sec x - 5\sec x \tan x$

D◯ $(e^x + 5)\sec^2 x$

E◯ $e^x \sec x \tan x$

F◯ $e^x \sec^2 x$

$\boxed{9\ pt}$ Given $y = \left(\frac{1}{8}x^2 + x - \frac{1}{x}\right)^4$, find $y'(2)$.

1.A◯ 40

B◯ 32

C◯ 64

D◯ 28

E◯ 10

F◯ 56

$\boxed{9\ pt}$ Find the derivative of $f(x) = \tan(e^{3x})$.

2.A◯ $\sec^2(e^{3x})$

B◯ $\tan(e^{3x})$

C◯ $3e^{3x}\sec(e^{3x})\tan(e^{3x})$

D◯ $3\tan(e^{3x})$

E◯ $\sec(e^{3x})\tan(e^{3x})$

F◯ $3e^{3x}\sec^2(e^{3x})$

$\boxed{8\ pt}$ Find the derivative of $f(x) = \ln(\cos x)$.

3.A◯ $\tan x$

B◯ $\sec x$

C◯ $-\sec x$

D◯ $\cot x$

E◯ $-\tan x$

F◯ $-\cot x$

$\boxed{8\ pt}$ A particle travels along a straight line. Its position in feet is given by $s(t) = t^3 - 3t^2 + 12$, where $t \geq 0$ is in seconds. Find the acceleration of the particle when the velocity is 9 ft/sec.

4.A◯ 48 ft/sec^2

B◯ 3 ft/sec^2

C◯ -18 ft/sec^2

D◯ -27 ft/sec^2

E◯ 489 ft/sec^2

F◯ 12 ft/sec^2

$\boxed{8\ pt}$ On which interval(s) is $y = \frac{1}{4}x^4 - x^3 + x^2$ decreasing?

5.A◯ $(-\infty, \infty)$

B◯ $(0, 1)$

C◯ $(0, 1)$ and $(2, \infty)$

D◯ $(-\infty, 2)$

E◯ $(0, 2)$

F◯ $(-\infty, 0)$ and $(1, 2)$

$\boxed{8\ pt}$ At what x value does $f(x) = \frac{x^3}{3} - x + 100000$ achieve its relative minimum?

6.A◯ -100

B◯ 100000

C◯ -1

D◯ 1

E◯ -10

F◯ 0

$\boxed{8\ pt}$ Which of the following is a critical number of $f(x) = \frac{x^3}{3} + x^2 - 8x + 5$?

7.A ◯ -8

B ◯ -2

C ◯ 3

D ◯ 5

E ◯ 0

F ◯ 2

$\boxed{8\ pt}$ Given $y^2+2xy^2-3x+5 = 0$. Use implicit differentiation to find $\frac{\mathrm{d}y}{\mathrm{d}x}$.

8.A ◯ $\dfrac{-2y+3x-5}{4xy}$

B ◯ $\dfrac{-2y^2-2y+3}{4xy}$

C ◯ $\dfrac{1}{2y}$

D ◯ $\dfrac{-2y^2+3}{2y+4xy}$

E ◯ $\dfrac{2y^2-2}{2y+4xy}$

F ◯ $\dfrac{-4y+3}{2y}$

$\boxed{8\ pt}$ Use implicit differentiation to find $\frac{\mathrm{d}y}{\mathrm{d}x}$ at the point $(0, -1)$ when $e^{xy} = 3x^2 - y^3$.

9.A ◯ $\frac{3}{2}$

B ◯ 3

C ◯ $\frac{3}{5}$

D ◯ $\frac{5}{3}$

E ◯ $\frac{1}{3}$

F ◯ $\frac{2}{3}$

$\boxed{8\ pt}$ The radius of a circle is increasing at a rate of 3 mm/sec. Find the rate at which the perimeter/circumference of the circle changes.

10.A ◯ 3 mm/sec

B ◯ 6 mm/sec

C ◯ 3π mm/sec

D ◯ 6π mm/sec

E ◯ $\dfrac{2\pi}{3}$ mm/sec

F ◯ 2π mm/sec

$\boxed{9\ pt}$ Water flows into a right cylindrical shaped swimming pool with a circular base at a rate of 4 m^3/min. The radius of the base is 3 m. How fast is the water level rising inside the swimming pool? The volume of a right cylinder with a circular base is $V = \pi r^2 h$, where r is the radius of the base and h is the height of the cylinder.

11.A ◯ $\frac{3}{8\pi}$ m/min

B ◯ $\frac{3}{16\pi}$ m/min

C ◯ $\frac{2}{3\pi}$ m/min

D ◯ $\frac{4}{3\pi}$ m/min

E ◯ $\frac{2}{9\pi}$ m/min

F ◯ $\frac{4}{9\pi}$ m/min

$\boxed{\textit{9 pt}}$ A 20 ft long ladder leans against a building. Suppose that the bottom of the ladder slides away horizontally at a rate of 4 ft/sec. How fast is the ladder sliding down the building when the top of the ladder is 12 ft from the ground?

12.A◯ $\frac{1216}{3}$ ft/sec

B◯ $\frac{16}{3}$ ft/sec

C◯ $\frac{473}{3}$ ft/sec

D◯ $\frac{26}{3}$ ft/sec

E◯ $\frac{50}{3}$ ft/sec

F◯ $\frac{34}{3}$ ft/sec

$\boxed{9\ pt}$ Which of the following functions satisfies $\lim_{x\to-\infty} f(x) = \infty$?

1.A◯ $f(x) = \dfrac{x-5}{x^2+25}$

B◯ $f(x) = \dfrac{x^3-x}{1+x^2}$

C◯ $f(x) = \dfrac{x^4-16}{6x+2}$

D◯ $f(x) = \dfrac{x^2+7}{x^3+3}$

E◯ $f(x) = \dfrac{10-x^2}{2x^3+x}$

F◯ $f(x) = \dfrac{x^5+2x}{x+3}$

$\boxed{9\ pt}$ Find the open interval where $y = 3x^3 - x^4$ is concave up.

2.A◯ $(0, 3)$

B◯ $(-\infty, 0)$ and $(2.25, \infty)$

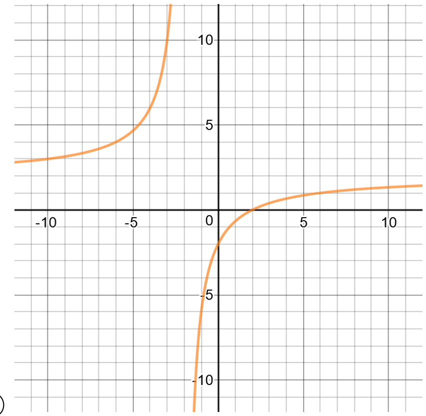
C◯ $(0, 2.25)$

D◯ $(-\infty, 0)$ and $(1.5, \infty)$

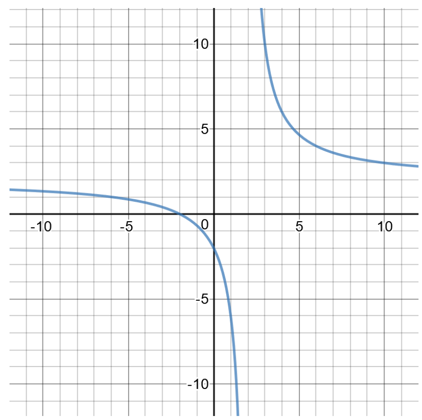
E◯ $(0, 1.5)$

F◯ $(-\infty, 0)$ and $(3, \infty)$

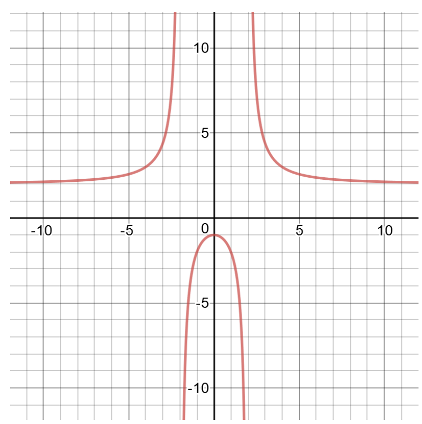
$\boxed{8\ pt}$ Which of the following is the graph of $y = \dfrac{2x^2+4}{x^2-4}$? Note: There are only four choices for this question. The letters (A, B, C and D) are at the bottom left corner of each corresponding graph.



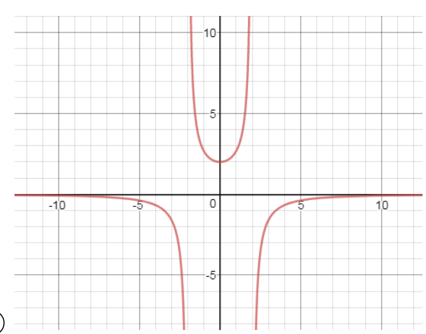
3.A◯



B◯



C◯



D◯

$\boxed{\textit{8 pt}}$ The critical numbers of a function $f(x)$ are $x = -2$ and $x = 1$. If the second derivative of the function is $f''(x) = 12x + 6$, then which of the following statements are true?

I. The relative minimum of $f(x)$ occurs at $x = 1$.

II. The relative minimum of $f(x)$ occurs at $x = -2$.

III. The relative maximum of $f(x)$ occurs at $x = 1$.

IV. The relative maximum of $f(x)$ occurs at $x = -2$.

V. The inflection point of $f(x)$ occurs at $x = \frac{1}{2}$.

VI. The inflection point of $f(x)$ occurs at $x = -\frac{1}{2}$.

4.A◯ Only I, II and VI are true

B◯ Only VI is true

C◯ Only I, IV and VI are true

D◯ Only II, III and V are true

E◯ Only V is true.

F◯ Only II, III and VI are true

$\boxed{\textit{8 pt}}$ Find the absolute extrema of $f(x) = \dfrac{1}{3}x^3 - 9x + 2$ on the closed interval $[0, 6]$.

5.A◯ Absolute minimum: $(3, -16)$; Absolute maximum: $(6, 20)$

B◯ Absolute minimum: $(0, 2)$; Absolute maximum: $(6, 20)$

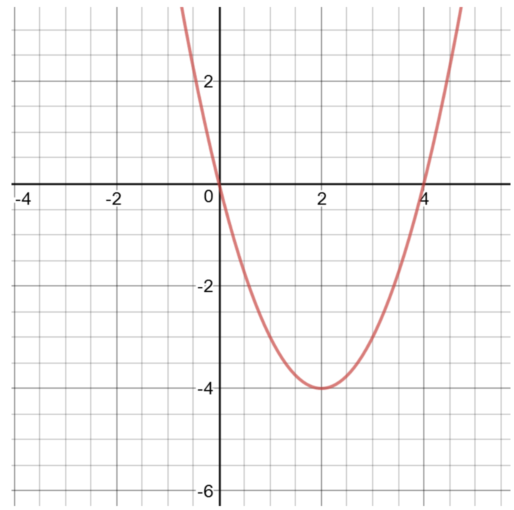
C◯ Absolute minimum: $(3, -16)$; Absolute maximum: $(-3, 20)$ and $(6, 20)$

D◯ Absolute minimum: $(3, -16)$; Absolute maximum: $(-3, 20)$

E◯ Absolute minimum: $(3, -16)$; Absolute maximum: None

F◯ Absolute minimum: $(0, 2)$; Absolute maximum: $(-3, 20)$

$\boxed{\textit{8 pt}}$ The graph of the derivative, $f'(x)$, is given below. What is the x-coordinate of the relative minimum of $f(x)$?



6.A◯ 3

B◯ 1

C◯ 5

D◯ 0

E◯ 4

F◯ 2

$\boxed{8\ pt}$ Evaluate $\int \left(6x^2 + \frac{\sqrt[3]{x^2}}{6}\right)\, dx$

7.A ◯ $6x^3 + \frac{\sqrt[3]{x^5}}{10} + C$

B ◯ $6x^3 + \frac{1}{9\sqrt[3]{x}} + C$

C ◯ $2x^2 + \frac{\sqrt{x^3}}{6} + C$

D ◯ $2x^3 + \frac{\sqrt[3]{x^5}}{10} + C$

E ◯ $12x + \frac{1}{9\sqrt[3]{x}} + C$

F ◯ $2x^3 + \frac{\sqrt{x^3}}{6} + C$

$\boxed{8\ pt}$ Solve the following initial value problem

$$f'(x) = \frac{1}{2}\sin x + \cos x, \qquad f(0) = 1$$

8.A ◯ $f(x) = -\frac{1}{2}\cos x + \sin x + \frac{3}{2}$

B ◯ $f(x) = -\frac{1}{2}\cos x - \sin x + \frac{3}{2}$

C ◯ $f(x) = -\frac{1}{2}\cos x - \sin x + \frac{1}{2}$

D ◯ $f(x) = \frac{1}{2}\cos x + \sin x + \frac{1}{2}$

E ◯ $f(x) = -\frac{1}{2}\cos x + \sin x + \frac{1}{2}$

F ◯ $f(x) = \frac{1}{2}\cos x - \sin x + \frac{1}{2}$

$\boxed{8\ pt}$ Find $y(1)$ given that $y'' = 4e^x$, $y'(0) = -4$, and $y(0) = 0$.

9.A ◯ $4e - 8$

B ◯ $4e - 4$

C ◯ $4e - 12$

D ◯ -4

E ◯ -12

F ◯ -8

$\boxed{8\ pt}$ You have 80 feet of fence to create a rectangular dog run, which will be bounded on one side by the wall of your house. What is the area of the largest dog run that you can create?

10.A ◯ 80 ft^2

B ◯ 1000 ft^2

C ◯ 972 ft^2

D ◯ $8\sqrt{10}$ ft^2

E ◯ 842 ft^2

F ◯ 800 ft^2

$\boxed{9\ pt}$ A company's marketing department has determined that if their product is sold at the price of p dollars per unit, they can sell $q = 2800 - 200p$ units. Each unit costs \$10 to make. What is the maximum profit that the company can make?

11.A ◯ 1000 dollars

B ◯ 980 dollars

C ◯ 800 dollars

D ◯ 600 dollars

E ◯ 880 dollars

F ◯ 1200 dollars

9 pt Anita wants to construct a kitchen island in the shape of a rectangular box with a square base. The wood for the base and sides costs 6 dollars per square foot, and the butcher block for the top costs 18 dollars per square foot. What is the largest volume of the island that Anita can create for 240 dollars? Round your answer to the nearest hundredth.

12.A◯ 8.65 ft^3

B◯ 12.17 ft^3

C◯ 10.64 ft^3

D◯ 4.41 ft^3

E◯ 18.43 ft^3

F◯ 20.79 ft^3