1)   Which statement or statements in the box below is/are true?

I	$\log_2 5x^2 = \log_2 5 + 2\log_2 x$
II	$\log_3 81 = 4$
III	$\log 78$ is approximately 1.8921

A.   I and II only.
B.   I and III only.
C.   II and III only.
D.   III only.
E.   All are true.

2)   Find the derivative of function g below. Which choice is that derivative?

$$g(x) = \left(e^x + 5x^2\right)^{14}$$

A. $g'(x) = 14\left(e^x + 10x\right)\left(e^{13x} + 5x^{26}\right)$

B. $g'(x) = 14\left(e^x + 10x\right)\left(e^x + 5x^2\right)^{13}$

C. $g'(x) = 14\left(e^x + 10x\right)^{13}$

D. $g'(x) = 14e^x\left(e^x + 5x^2\right)^{13}$

E. $g'(x) = 14\left(e^x + 10x\right)\left(e^x + 5x^2\right)$

3)   Find the derivative of the function below. Select the correct choice.

$$y = \frac{(x+2)^2}{e^x}$$

A. $\dfrac{dy}{dx} = \dfrac{-e^x}{x(x+2)}$

B. $\dfrac{dy}{dx} = \dfrac{x(x-2)}{e^x}$

C. $\dfrac{dy}{dx} = \dfrac{x(x+2)}{e^x}$

D. $\dfrac{dy}{dx} = \dfrac{-x(x+2)}{e^{2x}}$

E. $\dfrac{dy}{dx} = \dfrac{-x(x+2)}{e^x}$

4)   The growth of the world population (in millions) closely fits the exponential model function
      $A(t) = 3100e^{0.0166t}$, where t is the number of years since 1960. If the actual world population
      in 2000 was approximately 6115 million, by how much would the model underestimate the
      actual world population? Select the correct choice. Hint: Round the model answer initially to 3
      decimal places.

                                                            A.   Between 90 and 91 million
                                                            B.   Between 91 and 92 million
                                                            C.   Between 92 and 93 million
                                                            D.   Between 93 and 94 million
                                                            E.   Between 94 and 95 million

5)   Find the derivative of the function $g(x) = \dfrac{\ln x}{x^2}$. (Assume $x > 0$.)

                                            A. $g'(x) = \dfrac{1 - 2\ln x}{x^3}$

                                            B. $g'(x) = \dfrac{x^2(\ln x) - \ln(2x)}{x^4}$

                                            C. $g'(x) = \dfrac{2\ln x - 1}{x^3}$

                                            D. $g'(x) = \dfrac{1}{2x^2}$

                                            E.   None of the above.

6)   Solve the equation $3^{x+1} = 5^x$ using natural logarithms. Approximate your solution to 3 decimal
      places. Which statement best identifies the solution?

                                                            A. x is less than 1.
                                                            B. x is between 1 and 1.5.
                                                            C. x is between 1.5 and 2.0.
                                                            D. x is between 2.0 and 2.5.
                                                            E. x is greater than 2.5.

7)   Solve: $\log x + \log(x-3) = 1$

                                                 A. $x = -2,\ 5$

                                                 B. $x = 2$ only

                                                 C. $x = 5$ only

                                                 D. $x = -5,\ 2$

                                                 E. $x = 2,\ 5$

8)   On what interval(s) is the function h below increasing?

$$h(x) = \frac{2}{3}x^3 - x^2 - 4x + 2$$

                                                 A. $(-1, 2)$

                                                 B. $(-\infty, -1) \cup (2, \infty)$

                                                 C. $(-\infty, -2) \cup (1, \infty)$

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

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

9)   A manufacturer of CD players has determined that the profit $P(x)$ (in thousands of dollars) is related to the quantity x of CD players (**in hundreds**) manufactured and sold per month by the profit function $P(x) = -xe^x + 4e^x - 4$ for $\underline{0 < x < 3.9}$. At what production levels is the profit decreasing?

                                        A.   Between 300 and 390 CD players/month

                                          B.   Between 200 and 300 CD players/month

                                          C.   Between 200 and 390 CD players/month

                                          D.   Less than 200 CD players/month

                                          E.   The profit is never decreasing.

10)   Find any ordered pair (point), where the function below has a relative minimum.

$$f(x) = \frac{x^2}{x-2}$$

A. $\left(8, \frac{32}{3}\right)$

B. $(0, 0)$

C. $(4, 8)$

D. $\left(-4, -\frac{8}{3}\right)$

E. $\left(10, \frac{25}{2}\right)$

11)   Find all asymptote equations for the following rational function.

$$g(x) = \frac{2x^2 - 11x + 15}{x^2 + x - 6}$$

A. $y = \frac{1}{2}$, $x = -3$, $x = 2$

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

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

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

E. $y = \frac{1}{2}$, $x = -2$, $x = 3$

12)   For the function, $f(x) = \dfrac{-x}{1-x}$, find $f''(3)$ (the second derivative value when $x = 3$).

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

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

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

D. -1

E. 1

13) Which of the statements in the box is(are) true concerning the function $f(x) = x^3 - 6x^2 + 9x$?

|	
I	The function f is decreasing on (1, 3).
II	The function f is concave upward on (2, ∞).
III	There is a relative maximum at the point (0, 3).

A.   I, II, and III

B.   III only

C.   I and III only

D.   I only

E.   I and II only

14)   Find the inflection point for the graph of the function below.

$$f(x) = -x^3 - 12x^2 - 45x + 2$$

A. $(-3, 56)$
B. $(4, -434)$
C. $(-5, 52)$
D. $(0, 2)$
E. $(-4, 54)$

15)   Which is a sketch of the graph for the function $f(x) = 2x^3 - 3x^2$? Find intervals of increasing and decreasing, intervals of concavity, intercepts, relative maximums or minimums, etc.
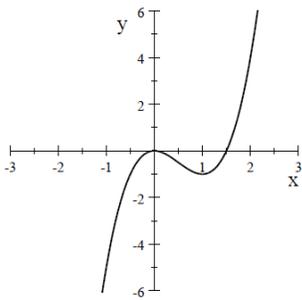
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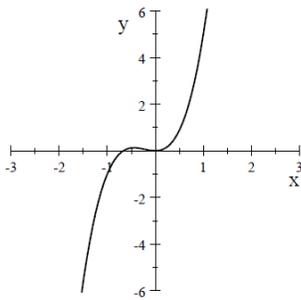
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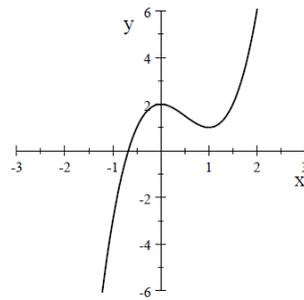
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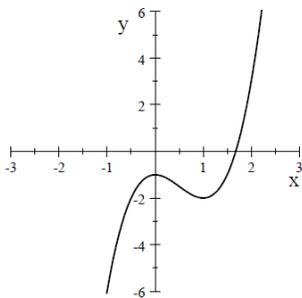
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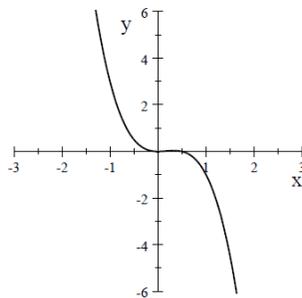
E.

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