1. Find the domain *D* of $f(x) = \frac{x-2}{x^2 + x - 6}$.

A.
$$D = (-\infty, 2) \cup (2, \infty)$$

B. $D = (-\infty, -3) \cup (-3, \infty)$
C. $D = (-\infty, -3) \cup (2, \infty)$
 \sqrt{D} . $D = (-\infty, -3) \cup (-3, 2) \cup (2, \infty)$
E. $D = (-3, 2)$

2. Given
$$g(x) = \frac{4}{x}$$
, then $\frac{g(x+h) - g(x)}{h} =$
A. $\frac{-4}{x^2}$
B. $\frac{4}{x+h} - \frac{4}{x}$
C. $\frac{-4}{(x+h)^2}$
 \sqrt{D} . $\frac{-4}{x(x+h)}$
E. $\frac{4}{x(x+h)}$

3.
$$\lim_{x \to 4} \quad \frac{x-4}{\sqrt{x-2}} =$$

A. Doesn't exist B. 0 C. 2 \sqrt{D} . 4 E. 1

4. Given distance function $s(t) = 3t - \cos t$, where *s* is in millimeters and *t* is in seconds, find the acceleration function a(t).

A. $a(t) = 3 + \cos t$ B. $a(t) = 3 + \sin t$ C. $a(t) = \sin t$ D. $a(t) = -\cos t$ \sqrt{E} . $a(t) = \cos t$

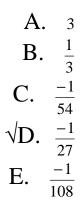
5. The derivative of
$$\frac{x^2+5}{x+1}$$
 is
A. $\frac{x^2-2x-5}{(x+1)^2}$
B. $\frac{3x^2+2x+6}{(x+1)^2}$
 \sqrt{C} . $\frac{x^2+2x-5}{(x+1)^2}$
D. $\frac{-x^2-2x+5}{(x+1)^2}$
E. $\frac{-3x^2-2x-6}{(x+1)^2}$

6. Find the *x*-coordinate only of any points where the slope of tangent lines to the graph of $f(x) = (x^2 - 8)(x+3)$ is 1.

A.
$$x = -3$$
, $x = 3$
B. $x = -1$, $x = 0$, $x = 3$
 \sqrt{C} . $x = 1$, $x = -3$
D. $x = 3$, $x = -1$
E. $x = 1$, $x = 0$, $x = -3$

- 7. What is the slope of the tangent line to the graph $y = (\frac{2x}{x-1})^3$ at the point (2, 64) ?
 - A. 64 B. 48 C. -48 \sqrt{D} . -96 E. 96

8. Given $g(x) = \sqrt{2x+1}$, find out g''(4) =



9.
$$\lim_{x \to \infty} \frac{3x^2 + x - 1}{1 + 2x - 4x^3} =$$

A. Doesn't exist B. $\frac{1}{4}$ C. 3 \sqrt{D} . 0 E. $-\frac{3}{4}$

10. Given $f(x) = x^4 - 4x^2$, please choose the correct statement about its relative Max/Min.

A. *f* has relative max at $x = \pm \sqrt{2}$, a relative min at x = 0.

 \sqrt{B} . *f* has a relative max at x = 0, relative min at $x = \pm\sqrt{2}$.

C. *f* has a relative max at $x = \sqrt{2}$, a relative min at $x = -\sqrt{2}$.

D. *f* has a relative max at $x = -\sqrt{2}$, a relative min at $x = \sqrt{2}$.

E. *f* has no relative max, but has relative min at $x = \pm \sqrt{2}$.

11. If $g(x) = x + \frac{4}{x}$, then on the closed interval [1, 3], A. *g* has an absolute max at *x*=1,and an absolute min at *x*=3. B. *g* has an absolute max at *x*=2,and an absolute min at *x*=3. \sqrt{C} . *g* has an absolute max at *x*=1,and an absolute min at *x*=2.

- D. *g* has an absolute max at x = 2, and an absolute min at x = 1.
- E. *g* has an absolute max at x=3, and an absolute min at x=1.

12. A container company is designing an open-top, squarebased, rectangular box that will have a volume of $32 in^3$. What is the minimum surface area of this box?

A. $32 in^{2}$ \sqrt{B} . $48 in^{2}$ C. $64 in^{2}$ D. $24 in^{2}$ E. $56 in^{2}$ 13. Approximate $\sqrt{3.95}$ by using linearization. Round your answer to 4 decimal places.

√A. 1.9875
B. 1.9906
C. 1.9938
D. 1.9972
E. 1.9998

14. Find an equation of tangent line to the curve $xy^2 + 3xy = 4$ at the point (1, 1).

A.
$$4x-5y = -1$$

 \sqrt{B} . $4x+5y = 9$
C. $5x+4y = 9$
D. $5x-4y = 1$
E. $x+y=2$

15. In calm waters oil spilling from the ruptured hull of a grounded tanker spreads in all directions. If the area polluted is a circle and is increasing at a rate of $200\pi ft^2/\text{sec}$, determine how fast the radius is increasing when the radius of the circle is 20ft.

A.
$$\frac{1}{2} ft/sec$$

B. $2ft/sec$
 \sqrt{C} . $5ft/sec$
D. $10ft/sec$
E. $0ft/sec$

16. What is the derivative of $2x^2e^{-x}$?

A.
$$4xe^{-x}$$

B. $-2x^2e^{-x}$
C. $2x(x+2)e^{-x}$
 \sqrt{D} . $2x(2-x)e^{-x}$
E. $-2x^2e^{-x-1}$

17. What is the derivative of $\frac{\ln x + 1}{x}$?

A. $\frac{1}{x^2}$ B. $\frac{\ln x + 1}{x^2}$ \sqrt{C} . $\frac{-\ln x}{x^2}$ D. $\frac{1 - \ln x}{x^2}$ E. $\frac{\ln x + 2}{x^2}$

18. The population of fish in the lake after time t, in months, is given by $P(t) = \frac{1000}{1+2e^{-0.5t}}$, what is the rate of change of P(t) at 4 months? Choose the closest answer.

A. 168/monthB. -168/month \sqrt{C} . 84/monthD. -84/monthE. 787/month 19. A sample of *E.coli* is growing exponentially at $40^{\circ}c$, represented by $P(t) = 1000e^{0.033t}$, where *t* is measured in minutes. What is the generation time? Choose the closest answer.

A.	693 min
Β.	1000 min
\sqrt{C} .	21min
D.	42 min
E.	63 min

20. $\int 2e^{-3x} dx = ?$

A.
$$-6e^{-3x} + c$$

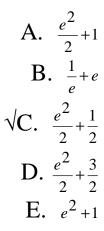
B. $-6e^{-3x-1} + c$
 \sqrt{C} . $\frac{-2}{3}e^{-3x} + c$
D. $\frac{2}{3}e^{-3x} + c$
E. $\frac{-2}{3}e^{-3x-1} + c$

21. Suppose that the acceleration function a(t) = -6t + 3, the initial velocity is v(0) = 10, and the initial position s(0) = 20. Find the distance function s(t).

A.
$$s(t) = -t^3 + \frac{3}{2}t^2 + 10t$$

B. $s(t) = -3t^2 + 3t + 20$
C. $s(t) = -t^3 + \frac{3}{2}t^2 + 10$
D. $s(t) = -t^3 + \frac{3}{2}t^2 + 20$
 \sqrt{E} . $s(t) = -t^3 + \frac{3}{2}t^2 + 10t + 20$

22. Evaluate $\int_{1}^{e} (x + \frac{1}{x}) dx$

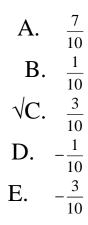


23. Find the area under the graph $f(x) = 2\cos 3x$ over the interval $\left[-\frac{\pi}{6}, \frac{\pi}{6}\right]$.

A.	0
B.	$\frac{2}{3}$
C.	$\frac{4}{3}$
D.	4
E.	8

 $\sqrt{}$

24. Find the area of the region bounded by y = x and $y = x^4$.



25. A city grows at a rate of 156t+1000 people per year, where *t* is time in years after the beginning of 2002. Given that the population at the beginning of 2002 is 13210. What is the population at the beginning of 2007 ?

No solution here.

A. 18210

B. 14990

- **C.** 16410
- **D.** 20410
- E. 26420