

1. Solve for x : $-2(1-x) + 2 = 3x + 1$.

- a) $x = -\frac{1}{5}$
- b) $x = -\frac{1}{2}$
- c) $x = -\frac{1}{4}$
- d) $x = -1$
- e) $x = -3$

2. Find all real solutions of the equation $x + 3\sqrt{x} - 4 = 0$.

- a) $x = -4$
- b) $x = 4; x = -1$
- c) $x = -1$
- d) $x = -4; x = 1$
- e) $x = 1$

3. Solve for x :

$$\sqrt{x-1} - 2 = x - 9.$$

- a) $x = 10, x = 5$
- b) $x = 10, x = -5$
- c) 10
- d) No solution
- e) 5

4. Solve for x :

$$2|3x - 1| \leq 8.$$

- a) $[-3, 2]$
- b) $(-\infty, -1] \cup \left[\frac{5}{3}, \infty\right)$
- c) $\left(-\infty, -\frac{4}{3}\right] \cup [2, \infty)$
- d) $\left[-\frac{4}{3}, 2\right]$
- e) $\left[-1, \frac{5}{3}\right]$

5. Solve the inequality $\frac{3x+6}{x+4} > 2$.

- a) $(-4, 2)$
- b) $(-\infty, -4) \cup (2, \infty)$
- c) $(-\infty, -2) \cup (4, \infty)$
- d) $(-2, 4)$
- e) $(2, \infty)$

6. Which of the following functions has a relative maximum?

- a) $-x^4$
- b) $|x - 2|$
- c) $\log_2(x)$
- d) e^{-x}
- e) $\sqrt{1+x}$

7. Given the piecewise-defined function

$$f(x) = \begin{cases} \sqrt{x+2}, & \text{if } x \geq 1 \\ -x^2, & \text{if } -1 \leq x < 1, \\ |x+1|, & \text{if } x < -1 \end{cases}$$

determine which of the following statements is TRUE.

- a) f is increasing on $(0, \infty)$
- b) f is constant on $(-\infty, -1)$
- c) $x = -2$ is an x -intercept
- d) $f(-1) = -1$
- e) at $x = 0$, f has a relative minimum

8. Given the function $f(x) = \frac{1}{x}$, find and simplify $\frac{f(x+h) - f(x)}{h}$.

- a) $\frac{1}{h^2}$
- b) $\frac{1}{x(x+h)}$
- c) $-\frac{1}{x^2}$
- d) $-\frac{1}{x(x+h)}$
- e) $-\frac{h}{x(x+h)}$

9. Find $(f \circ f)(0)$, where

$$f(x) = \begin{cases} x^2 + 1 & \text{if } x < 0 \\ 2 & \text{if } x = 0 \\ \sqrt{x+2} - x^2 & \text{if } 0 < x \leq 2 \\ 16/x^2 & \text{if } x > 2 \end{cases}$$

- a) -2
- b) 0
- c) 4
- d) $\sqrt{3} - 1$
- e) 16

10. Find the inverse function of $f(x) = \frac{5 - 9x}{7x}$.

- a) $\frac{5 + 7x}{9}$
- b) $\frac{5}{9 - 7x}$
- c) $\frac{5}{7}x - 9$
- d) $\frac{5}{7x + 9}$
- e) $\frac{5 - 7x}{9}$

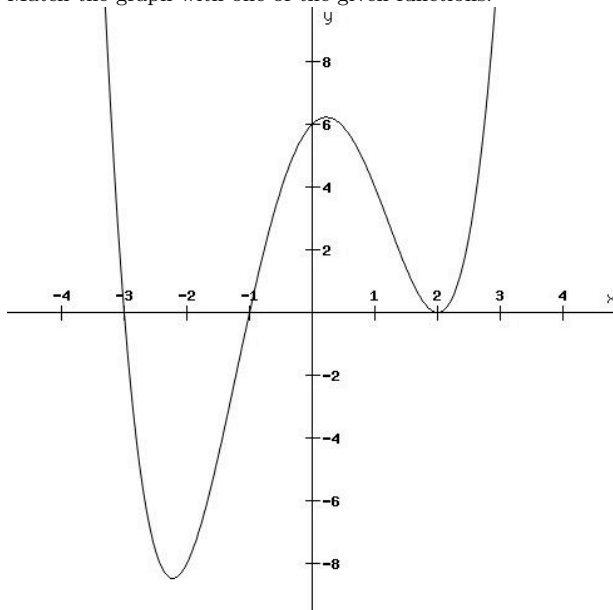
11. Which of the following functions is one-to-one?

- a) $f(x) = 7|x|$
- b) $f(x) = \frac{2}{5}$
- c) $f(x) = \begin{cases} -5x & \text{if } x < 0 \\ 2 - x & \text{if } x > 2 \end{cases}$
- d) $f(x) = x^2(x - 1)(x - 2)$
- e) $f(x) = -x^3(x - 1)$

12. A projectile is launched vertically from the ground into the air with initial velocity v_0 . It reaches the ground in 10 minutes. Assume that the height of the projectile above the ground after t minutes is given by $h(t) = -5t^2 + v_0t$. Find the initial velocity v_0 of the projectile.

- a) 100
- b) 0
- c) undefined
- d) 25
- e) 50

13. Match the graph with one of the given functions:



- a) $f(x) = -(x + 3)(x + 1)(x - 2)^2$
- b) $f(x) = \frac{1}{2}(x + 2)^2(x - 1)(x + 3)$
- c) $f(x) = \frac{1}{2}(x + 3)(x + 1)(x - 2)^2$
- d) $f(x) = 2(x + 3)^2(x - 2)x$
- e) $f(x) = \frac{1}{4}(x - 2)^4(x + 1)^2(x - 3)$

14. Give the REMAINDER of

$$\frac{2x^3 + 7x^2 + 2x - 3}{x + 3}$$

- a) 1
- b) -3
- c) 3
- d) -1
- e) 0

15. Find all vertical asymptotes of the graph of $f(x) = \frac{-x^2 - x + 6}{2x^2 - 2x - 4}$.

- a) $x = -1, x = 2$
- b) $x = -3, x = 2$
- c) $y = -3, y = 2$
- d) $x = -1$
- e) The graph has no vertical asymptotes

16. Find all horizontal asymptotes of the graph of $f(x) = \frac{x^2 - x}{2x^2 + x - 1}$. 21. Match the expression $\log_3 \left(\frac{27x^5}{\sqrt[3]{y-1}} \right)$ with an equivalent expression.

- a) $y = 2$
- b) $y = 0$
- c) $y = \frac{1}{2}$
- d) $y = -3$
- e) $x = \frac{1}{2}, x = -1$

- a) $2 + 5 \log_3 x - 3 \log_3 y$
- b) $2 - 5 \log_3 x + \frac{1}{3} \log_3 y$
- c) $\log 27 + 5 \log_3 x - 3 \log_3(y - 1)$
- d) $3 + 5 \log_3 x - 3 \log_3(y - 1)$
- e) $3 + 5 \log_3 x - \frac{1}{3} \log_3(y - 1)$

17. Solve for x : $\left(\frac{1}{3}\right)^{x-6} = 27^x$.

- a) $x = \frac{3}{2}$
- b) $x = \frac{2}{3}$
- c) $x = \frac{2}{5}$
- d) $x = -\frac{3}{2}$
- e) $x = -\frac{5}{2}$

22. Which of the following is equal to $\log_{\sqrt{7}} 2$?

- a) $\frac{2}{\log_7 2}$
- b) $\frac{\log_7 2}{4}$
- c) $\frac{\log_7 2}{2}$
- d) $2 \log_7 2$
- e) $\log_7 2$

18. Which of the following is FALSE for the graph of $f(x) = e^{-x}$?

- a) It has a y -intercept at $y = 1$
- b) It is decreasing on the interval $(-\infty, \infty)$
- c) Its domain is $(-\infty, \infty)$
- d) Its range is $(-\infty, 0)$
- e) It has the horizontal asymptote $y = 0$

23. Solve the equation $\log_2(x + 2) - \log_2 x = \log_2(x - 1) + 2 \log_2 \sqrt{2}$.

- a) $x = 1$
- b) $x = -1/2$
- c) $x = 2$
- d) $x = 2; x = -1/2$
- e) no solution

19. Compute $\log_2(1) + \frac{\ln(e^2)}{\log(100)}$.

- a) 0
- b) $\ln \left(\frac{e^2}{100} \right)$
- c) 1
- d) undefined
- e) 2

24. Solve for x :

$$\log_6(x) + \log_6(x - 1) = 1.$$

- a) $x = 6$
- b) $x = -2, x = 3$
- c) $x = 3$
- d) $x = -3, x = 2$
- e) $x = 2$

20. Find the domain of $f(x) = \log_{2/3} \left(\frac{x}{x+1} \right)$.

- a) $(0, \infty)$
- b) $(-\infty, -1) \cup (0, \infty)$
- c) $[0, \infty)$
- d) $(-\infty, -1) \cup (-1, \infty)$
- e) $(-\infty, -1) \cup [0, \infty)$

25. Solve for x :

$$3^{2x+1} = 7^x$$

a) $x = \frac{\ln(3)}{2 - \ln(7)}$

b) $x = \frac{\ln(7)}{\ln(3) - 2}$

c) $x = \frac{\ln(3)}{\ln(7) - 2\ln(3)}$

d) $x = \frac{2 - \ln(7)}{\ln(3)}$

e) $x = \frac{\ln(3) - 2}{\ln(7)}$

1. D
2. E
3. C
4. E
5. B
6. A
7. D
8. D
9. A
10. D
11. C
12. E
13. C
14. E
15. D
16. C
17. A
18. D
19. C
20. B
21. E
22. D
23. C
24. C
25. C