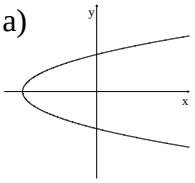
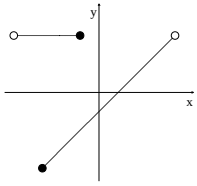
1. In the process of solving the radical equation, $x-5=\sqrt{3x-11}$, you will need to solve which of the following quadratic equations?

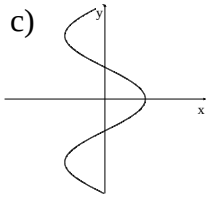
   a) $x^2-7x+16=0$ b) $x^2-3x-14=0$ c) $x^2+13x-36=0$

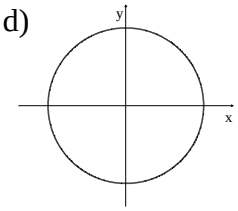
   d) $x^2-13x+36=0$ e) none of these

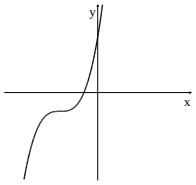
2. Which of the following relations defines *y* as a function of *x*?

   a) 

   b) 

   c) 

   d) 

   e) 

3. Which of the following relations defines *y* as a function of *x*?

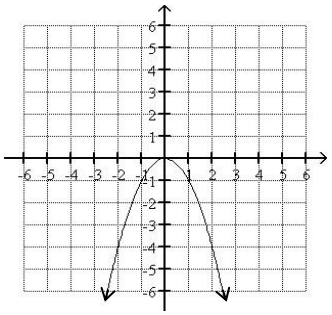
   a) $\{(-1,3),(-2,1),(-1,8),(3,5)\}$ b) $\{(-1,8),(8,1),(0,8),(3,1)\}$ c) $\{(0,4),(4,0),(0,-4),(3,0)\}$

   d) $\{(1,2),(3,4),(4,3),(1,1)\}$ e) $\{(6,10),(-6,5),(0,6),(-6,-5)\}$

4. Find the distance between the points (5,4) and (1,−1).

   a) 5 b) $3\sqrt{5}$ c) 9 d) 41 e) none of these

5. Determine whether the graph shown below is symmetric with respect to the *x*-axis, *y*-axis, origin, or none of these. Then determine whether the function represented by the graph is even, odd, or neither.



   a) *y*-axis, even b) *y*-axis, odd c) *x*-axis, even d) origin, odd

   e) none of these, neither

6. Suppose that the function $p(x) = -x^2 + 26x + 300$ describes the revenue in millions of dollars generated from sales of a certain item for a company, where x represents the number of items sold. What is the maximum revenue the company may achieve for sales of this item?

a) \$13 million b) \$469 million c) \$807 million d) \$169 million e) \$339 million

7. Find the center and radius of the circle whose equation is $x^2 - 10x + y^2 + 6y - 1 = 0$.

a) center = (–5,3); radius = $\sqrt{35}$ b) center = (–5,3); radius = 35 c) center = (5,–3); radius = $\sqrt{35}$

d) center = (5,–3); radius = 35 e) center = (5,–3); radius = 1

8. Determine whether the function $f(x) = -3(x - 1)^2 - 2$ has a minimum value or a maximum value and then find the value.

a) It has a minimum value of 1. b) It has a maximum value of 1.

c) It has a maximum value of 2. d) It has a minimum value of –2.

e) It has a maximum value of –2.

9. Given the functions $f(x) = 4x + 3$ and $g(x) = x^2 - 7x - 9$, find $(f + g)(x)$.

a) $(f + g)(x) = x^2 - 4x - 5$ b) $(f + g)(x) = x^2 - 3x - 6$

c) $(f + g)(x) = -x^2 + 3x + 6$ d) $(f + g)(x) = x^2 - 11x - 12$

e) $(f + g)(x) = 5x^2 - 7x - 6$

10. Given the functions $f(x) = 3x^2 - 7x - 8$ and $g(x) = 2x^2 - 3x + 4$, find $(f - g)(x)$.

a) $(f - g)(x) = -x^2 + 4x + 12$ b) $(f - g)(x) = -x^2 - 4x - 4$

c) $(f - g)(x) = x^2 - 10x - 4$ d) $(f - g)(x) = x^2 - 7x - 8$

e) $(f - g)(x) = x^2 - 4x - 12$

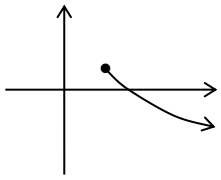
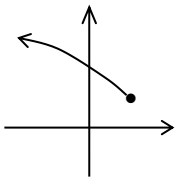
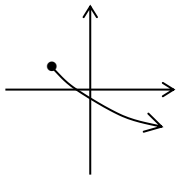
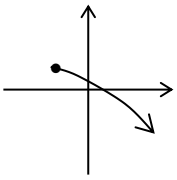
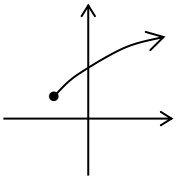
11. If $f(x) = 1 - x$ and $g(x) = -3x^2 - x - 1$, find $(g \circ f)(x)$.

a) $-3x^2 + 7x - 4$ b) $3x^2 + x + 2$ c) $-3x^2 + 7x - 5$ d) $-3x^2 + 5x - 4$ e) none of these

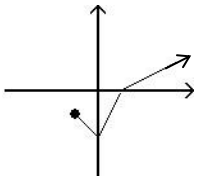
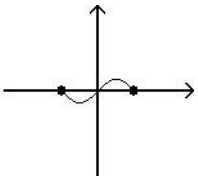
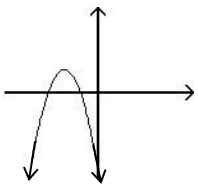
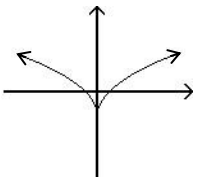
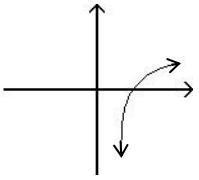
12. Find the domain and range of $f(x) = |x - 5|$.

a) domain = $(-\infty,\infty)$, range = $(-\infty,\infty)$
b) domain = $(-\infty,\infty)$, range = $[0,\infty)$
c) domain = $(-\infty,\infty)$, range = $[5,\infty]$
d) domain = $[0,\infty)$, range = $[-5,\infty)$
e) domain = $[0,\infty)$, range = $[0,\infty)$

13. Which of the following is the graph of $g(x) = -\sqrt{x+2}+1$?

a) 
b) 
c) 
d) 
e) 

14. Determine which function graphed below has an inverse function.

a) 
b) 
c) 
d) 
e) 

15. Solve $3^{4x-1} = 6$.

a) $\left\{\frac{3}{4}\right\}$
b) $\left\{\frac{6 + \ln 3}{4 \ln 3}\right\}$
c) $\left\{\frac{\ln 6 + \ln 3}{4 \ln 3}\right\}$
d) $\left\{\frac{\ln 6}{4 \ln 3}\right\}$
e) $\left\{\frac{\ln 9}{4 \ln 3}\right\}$

16. Solve $2x^2 + 5x - 12 \le 0$.

a) $\left(-\infty, \frac{3}{2}\right]$
b) $(-\infty,-4] \cup \left[\frac{3}{2},\infty\right)$
c) $\left[-4, \frac{3}{2}\right]$
d) $[-4,\infty)$
e) none of these

17. Find the domain of $f(x) = \sqrt{3-x}$.

a) $(-\infty,3)$
b) $(-\infty,3]$
c) $(3,\infty)$
d) $[3,\infty)$
e) $[0,\infty)$

18. Find the domain of the function $f(x)=\dfrac{x-6}{5-x}$.

a) $(-\infty,5)\cup(5,\infty)$ b) $(-\infty,6)\cup(6,\infty)$ c) $(-\infty,5)\cup(-5,\infty)$ d) $(5,6)$ e) $(-\infty,\infty)$

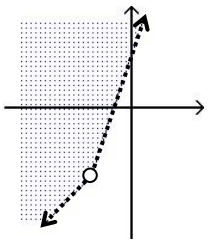
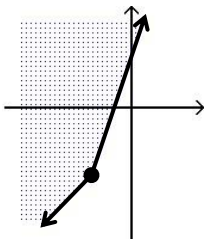
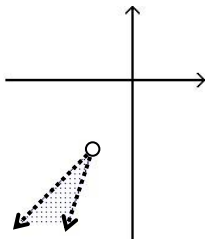
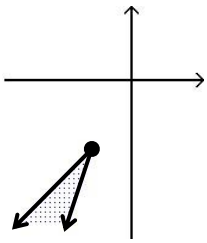
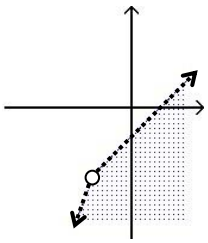
19. Evaluate $\log_3 \dfrac{1}{9}$.

a) $\frac{1}{2}$ b) $-\frac{1}{2}$ c) 2 d) –2 e) $\frac{1}{3}$

20. Use the change of base formula to evaluate $\log_4 6$. Round the answer to four decimal places.

a) 1.6628 b) 0.7737 c) 3.6124 d) 1.2925 e) 3.1126

21. Which of the following most resembles the solution set of the given system? $\begin{cases} x-y<1 \\ y>3x+2 \end{cases}$

a)  b)  c)  d)  e) 

22. Simplify $\ln e^{6/5}$.

a) $\frac{5}{6}$ b) $\frac{6}{5}$ c) $e^{6/5}$ d) 1 e) $\frac{6}{5}e$

23. Solve $|3x-2|\le 5$.

a) $(-\infty,-1]$ b) $\left[-1,\dfrac{7}{3}\right]$ c) $\left(-\infty,\dfrac{7}{3}\right]$ d) $(-\infty,-1]\cup\left[\dfrac{7}{3},\infty\right)$ e) $\left\{-1,\dfrac{7}{3}\right\}$

24. Find the value of x in the solution for the following system. $\begin{cases} 3x-y-z=5 \\ 2x+3y-z=-16 \\ x+2y+4z=3 \end{cases}$

a) 1 b) –2 c) 0 d) 3 e) none of these

25. Which types of symmetry does the graph of $7y^2 = 4x^3 - 5$ possess?

a) *x*-axis only b) *y*-axis only c) origin only d) *x*-axis, *y*-axis, origin e) no symmetry

26. Which equation can be used to determine how long it will it take a $1000 investment to double if it is invested at 6% interest compounded continuously?

Compound interest formulas: $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$.

a) $2000 = 1000(1.06)^t$ b) $1000 = 2000(1.06)^t$ c) $1000 = 2000e^{0.06\,t}$

d) $2 = 1000e^{0.06\,t}$ e) $2000 = 1000e^{0.06\,t}$

27. Find the accumulated value of an investment of $5000 after 10 years at an interest rate of 6.3% if the interest is compounded continuously. Round the answer to the nearest dollar.

Compound interest formulas: $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$.

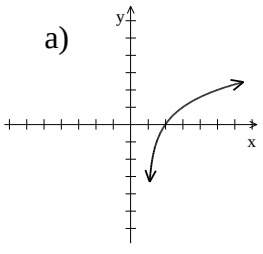
a) $53251 b) $9210 c) $9388 d) $8150 e) $5325

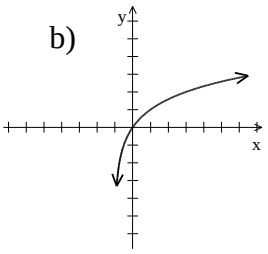
28. A sum of $3500 is invested at an annual rate of 8%. Find the balance in the account after 5 years subject to quarterly compounding. Round to the nearest dollar.

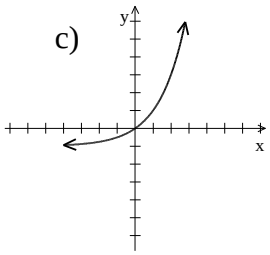
Compound interest formulas: $A = P\left(1+\frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$.

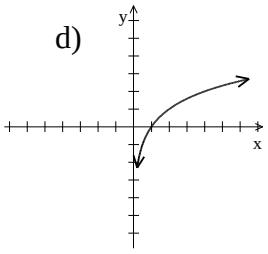
a) $5201 b) $4900 c) $5143 d) $5181 e) $5221

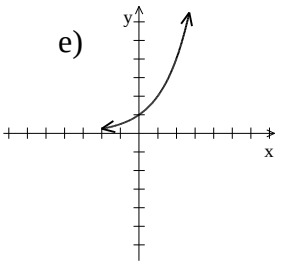
29. Which of the following most resembles the graph of $f(x) = \log_2(x-1)$?

a) 

b) 

c) 

d) 

e) 

30. Expand $\log_7\left(\frac{\sqrt[5]{9}}{a^4 b}\right)$.

a) $\log_7 9 - 4\log_7 a - 4\log_7 b$ b) $\frac{1}{5}\log_7 9 - 4\log_7 a - \log_7 b$ c) $\frac{1}{5}\log_7 9 - 4\log_7 a + \log_7 b$

d) $5\log_7 9 - 4\log_7 a - \log_7 b$ e) $5\log_7 9 - 4\log_7 a + \log_7 b$

31. Let $f(x) = \frac{2}{x-3}$. Find $f^{-1}(x)$.

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

d) $f^{-1}(x) = \frac{x-3}{2}$ e) $f^{-1}(x) = \frac{3}{x} - 2$

32. How many solutions does the following system have? $\begin{cases} 6x - 4y = 18 \\ y = \frac{3}{2}x - \frac{9}{2} \end{cases}$

a) 0 b) 1 c) 2 d) 3 e) infinitely many

33. Let $f(x) = 2x^2 - 2x + 1$. Find and simplify $\frac{f(x+h) - f(x)}{h}$.

a) $4x + 2h + 2$ b) $4x + 2h - 2$ c) $2x + 2h - 2$ d) $2x + h - 2$ e) 1

34. Solve $32^{2x} = \left(\frac{1}{2}\right)^{5x-1}$.

a) $\left\{\frac{1}{5}\right\}$ b) $\left\{-\frac{1}{5}\right\}$ c) $\left\{\frac{1}{15}\right\}$ d) $\left\{-\frac{1}{15}\right\}$ e) none of these

35. Solve $3\ln(4x) = 6$.

a) $\{e^2\}$ b) $\{e^{1/2}\}$ c) $\left\{\frac{e^2}{4}\right\}$ d) $\left\{\frac{2}{\ln 4}\right\}$ e) $\{\ \}$

36. Find the x-intercepts for the graph of $f(x) = 3x^2 - 2x + 1$.

a) $(-1,0)$ and $(3,0)$ b) $\left(\frac{1\pm\sqrt{2}}{3},0\right)$ c) $\left(\frac{2\pm\sqrt{14}}{6},0\right)$

d) $\left(-\frac{1}{3},0\right)$ and $(1,0)$ e) no x-intercepts

37. Solve $\sqrt{2x+13}-\sqrt{x+10}=1$.

a) $\{\pm 6\}$ b) $\{4,-8\}$ c) $\{6\}$ d) $\{\ \}$ e) none of these

38. Find the domain of $f(x) = \log(x + 5)$.

a) $(-\infty,-5)$ b) $(-\infty,-5]$ c) $(-5,\infty)$ d) $[-5,\infty)$ e) $(0,\infty)$

39. Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions.

$\log_3\left(81x^2\right)$

a) $\log_3(81)\log_3\left(x^2\right)$ b) $4+2\log_3 x$ c) $4\log_3\left(x^2\right)$

d) $\log_3\left(81+x^2\right)$ e) $\log_3 81-2\log_3 x$

40. $\frac{1}{2}\log_b y-4\log_b x-\log_b z$ equals:

a) $\log_b\left(\frac{1}{2}y-4x-z\right)$ b) $\log_b\left(\sqrt{y}-x^4-z\right)$ c) $\log_b\frac{z\sqrt{y}}{x^4}$

d) $\log_b\frac{\sqrt{y}}{x^4z}$ e) $\frac{\log_b\sqrt{y}}{\log_b x^4-\log_b z}$

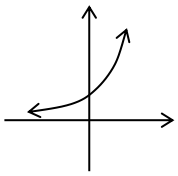
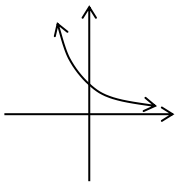
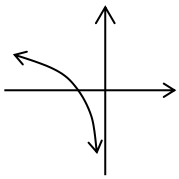
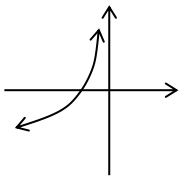
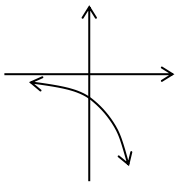
41. If $f(x)=\frac{9}{x+12}$ and $g(x)=\sqrt{x}$, find $(g\circ f)(4)$.

a) $\frac{3}{4}$ b) $\frac{9}{14}$ c) $\frac{9}{8}$ d) $\frac{9}{16}$ e) none of these

42. Suppose the point (–2,8) is on the graph of $y = f(x)$. Find the corresponding point on the graph of $y = \frac{1}{2} f(x)$.

a) (–2,4) b) (–1,8) c) (–1,4) d) (– 4,16) e) $\left(-2, \frac{1}{2}\right)$

43. Which of the following is the graph of $f(x) = 2^{-x}$?

a)  b)  c)  d)  e) 

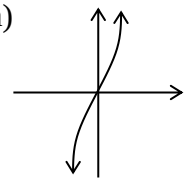
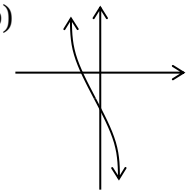
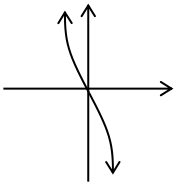
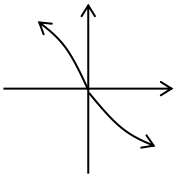
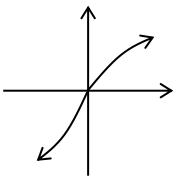
44. If $f(x) = \begin{cases} 2x+3 & \text{for } x \le -1 \\ 1-5x & \text{for } x > -1 \end{cases}$, find $f(0)$.

a) 3 b) –1 c) 0 d) – 4 e) none of these

45. Which of the following functions is odd?

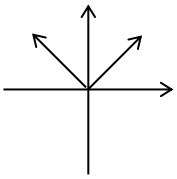
a) $f(x) = x^2 + 4$ b) $f(x) = x^3 + 4$ c) $f(x) = x^2 + 4x$ d) $f(x) = x^3 + 4x$ e) $f(x) = x + 4$

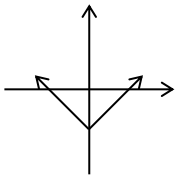
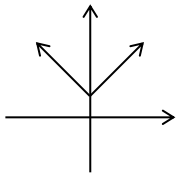
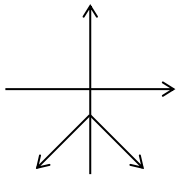
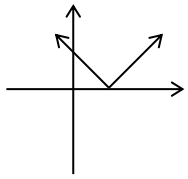
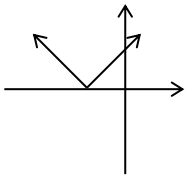
46. Which of the following is the graph of $f(x) = -2x^3$?

a)  b)  c)  d)  e) 

47. Solve $\ln(5t + 1) - \ln(t + 2) = \ln 3$.

a) {1} b) {0} c) $\left\{\frac{3}{2}\right\}$ d) $\left\{\frac{5}{2}\right\}$ e) { }

48. The graph of $y = f(x)$ is  . Which of the following is the graph of $y = f(x) - 3$?

a)  b)  c)  d)  e) 

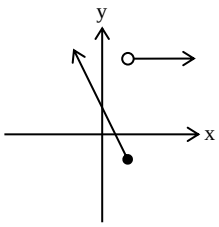
49. Solve $\log x + \log(2x + 1) = 1$.

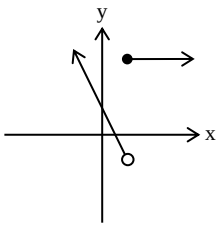
a) $\left\{\frac{1}{2}\right\}$ b) $\left\{\frac{5}{2}, 2\right\}$ c) $\left\{-\frac{5}{2}, 2\right\}$ d) $\left\{-1, \frac{1}{2}\right\}$ e) {2}

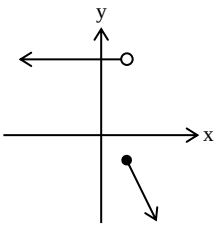
50. Which of the following is the equation of the asymptote for the graph of $f(x) = 2^{x+3}$?

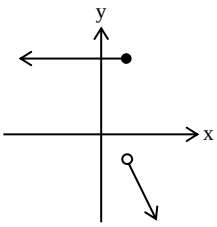
a) $x = 3$ b) $x = -3$ c) $y = 3$ d) $y = -3$ e) $y = 0$

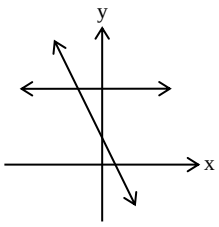
51. Graph $f(x) = \begin{cases} 3 & \text{for } x < 1 \\ 1 - 2x & \text{for } x \geq 1 \end{cases}$.

a) 

b) 

c) 

d) 

e) 

Answers:

1. d
2. e
3. b
4. e
5. a
6. b
7. c
8. e
9. b
10. e
11. c
12. b
13. c
14. e
15. c
16. c
17. b
18. a
19. d
20. d
21. a
22. b
23. b
24. a
25. a
26. e
27. c
28. a
29. a
30. b
31. a
32. e
33. b
34. c
35. c
36. e
37. c
38. c
39. b
40. d
41. a
42. a
43. b
44. e
45. d
46. c
47. d
48. a
49. e
50. e
51. c