1. Find the domain of the function $f(x)=\dfrac{\sqrt{x+2}}{x}$.

   a. $(-\infty,-2]$
   b. $[-2,\infty)$
   c. $[-2,0)\cup(0,\infty)$
   d. $[-\infty,0)\cup(0,\infty)$
   e. $[-2,0)$

2. If you shift the graph of $y=f(x)$ four units down and two units to the left, you get the graph

   a. $y=f(x+2)+4$
   b. $y=f(x-2)+4$
   c. $y=f(x-4)+2$
   d. $y=f(x+4)-2$
   e. $y=f(x+2)-4$

3. Choose the piecewise function for the given graph.

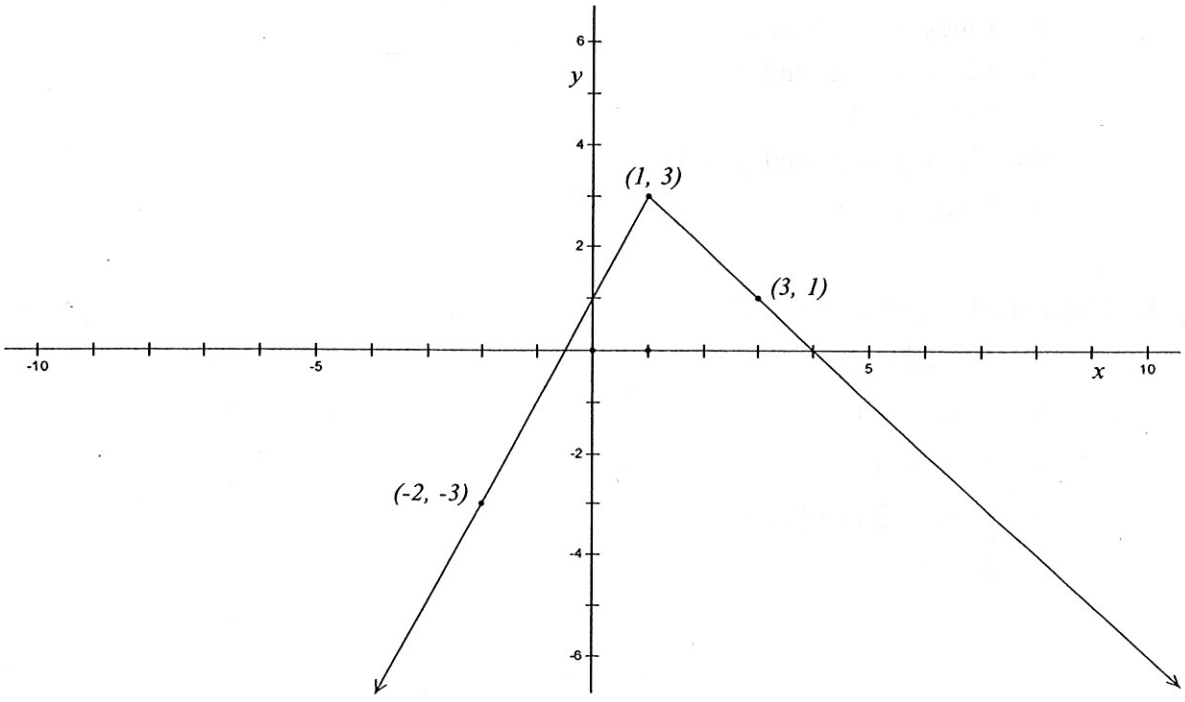
   a. $\begin{cases}3, for, x>1\\-1, for, x<1\end{cases}$

   b. $\begin{cases}x-1, for, x\le 1\\-x, for, x\ge 1\end{cases}$

   c. $\begin{cases}2x-2, for, x<1\\-x-2, for, x\ge 1\end{cases}$

   d. $\begin{cases}x+2, for, x<1\\2-x, for, x>1\end{cases}$

   e. $\begin{cases}2x+1, for, x\le 1\\4-x, for, x>1\end{cases}$



4. Let $f(x)=x-2$, find $f(f(f(f(5))))$.
   a. 5
   b. 3
   c. 1
   d. -1
   e. -3

5. If the point $(2,-1)$ is on the graph of $f(x)$ and $f(x)$ is known to be odd, what other point must be on the graph of $f(x)$?
   a. $(2,-1)$
   b. $(-2,-1)$
   c. $(-2,1)$
   d. $(2,1)$
   e. $(-1,2)$

6. Find the domain (D) and range (R) of the function $f(x)=19x^2-19$.
   a. $D=(-1,1),\ R=(0,\infty)$
   b. $D=(-\infty,\infty),\ R=(0,\infty)$
   c. $D=(-1,1),\ R=(19,\infty)$
   d. $D=(-\infty,\infty),\ R=[19,\infty)$
   e. $D=(-\infty,\infty),\ R=[-19,\infty)$

7. Find the vertical asymptotes (VA) of $f(x)=\dfrac{x^2-9}{x^2-5x+6}$.
   a. Lines $x=-2$ and $x=-3$
   b. Lines $x=2$ and $x=3$
   c. Line $x=2$
   d. Lines $y=2$ and $y=3$
   e. Lines $y=1$

8. Solve the inequality $x^2>4$.
   a. $(-2,2)$
   b. $(-2,-\infty)$
   c. $(-4,\infty)$
   d. $(-\infty,-2)\cup(2,\infty)$
   e. $(0,\infty)$

9. Let $f(x)=\dfrac{x+2}{x-3}$. Find $f^{-1}(-1)$.

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

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

   c. 3

   d. $-\dfrac{5}{2}$

   e. undefined

10. Let $f(x)=\dfrac{1}{x}$. Find $\dfrac{f(x+h)-f(x)}{h}$.

   a. $f(x)=\dfrac{h}{x(x+h)}$

   b. $f(x)=\dfrac{1}{x^2}$

   c. $f(x)=\dfrac{-1}{x(x+h)}$

   d. $f(x)=\dfrac{2x-h}{x(x+h)h}$

   e. $f(x)=\dfrac{1}{x(x+h)}$

11. Which of the following numbers is *not* a potential rational zero of the polynomial function $f(x)=2x^3+x^2+36$.

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

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

   c. $\dfrac{1}{3}$

   d. 12

   e. 4

12. Given the equation $3^x = e^{x+1}$, solve for x and approximate its value to four decimal places.

   a. -10.1407

   b. 10.1407

   c. -0.0986

   d. 0.0986

   e. -10.1479

13. Rewrite $\ln(1000^{x})$ in terms of $\ln(5)$ and $\ln(2)$.

(a) $x(3\ln(5)+3\ln(2))$

(b) $9\ln(5)\ln(2)$

(c) $3x^{2}\ln(5)\ln(2)$

(d) $3x\ln(5)-4x\ln(2)$

(e) $x(2\ln(5)+4\ln(2))$

14. Solve for x in the following equation $1+\log(7)=2x+3x\log(7)$.

a. $\dfrac{1}{2+3\log(7)}$

b. $\dfrac{2+3\log(7)}{1+\log(7)}$

c. $\dfrac{1+\log(7)}{2+3\log(7)}$

d. $\dfrac{1}{1+\log(7)}$

e. $1+\log(7)$

15. Solve for t *(time)* in the following equation $A = Pe^{rt}$.

a. $t = \dfrac{r}{\ln(A/P)}$

b. $t = \dfrac{\ln(P/A)}{r}$

c. $t = \dfrac{1+\log(A)}{1-\log(P)}$

d. $t = \dfrac{r\ln(A)}{P}$

e. $t = \dfrac{\ln(A/P)}{r}$

16. You want to invest \$5,000 to accumulate \$1,000,000 in 50 years. You decide to look for a bank that compounds the interest continuously. What annual interest rate should you look for? Approximate your answer to two decimal places.

a. 10.60%
b. 11.51%
c. 13.82%
d. 8.83%
e. 7.57%

17. The area of a rectangle is given by the function $A(x) = -x^2 + 6x + 20$. Find the maximum value of its area.

a. 47 square units
b. 29 square units
c. 7 square units
d. 90 square units
e. 15 square units

18. Only one of the following statements is true of the exponential function $f(x) = e^x$.

a. $y \to 0$ as $x \to -\infty$ and $y \to \infty$ as $x \to \infty$
b. $y \to \infty$ as $x \to -\infty$ and $y \to 0$ as $x \to \infty$
c. $y \to \infty$ as $x \to -\infty$ and $y \to \infty$ as $x \to \infty$
d. $y \to 0$ as $x \to \infty$ and $y \to -\infty$ as $x \to -\infty$
e. $y \to 0$ as $x \to -\infty$ and $y \to -\infty$ as $x \to \infty$

19. What remainder do you get when you divide $x^{89} - 2x^{50} + 1$ by $x + 1$?

a. 2
b. 4
c. -2
d. 3
e. 5

20. Solve the inequality $\dfrac{x-8}{x+8} \geq 0$.

a. $[-8,8)$
b. $(-\infty,-8) \cup [8,\infty)$
c. $(-\infty,-8]$
d. $[8,\infty)$
e. $(-\infty,-8] \cup [8,\infty)$

21. Only one of the following statements *is true* for all values of x and y.

a. $\ln(x^3) = (\ln(x))^3$

b. $\ln(\frac{x}{y}) = \frac{\ln(x)}{\ln(y)}$

c. $\ln(e^{3x}) = 3x$

d. $\ln(x+y) = \ln(x) + \ln(y)$

e. $\log(x^3) = 3$

22. Solve for x in the following exponential equation, $3^{x^2-3x-2} = \frac{1}{9}$.

a. $x = -1$ *or* $x = 4$

b. $x = 3$

c. $x = 0$ *or* $x = 3$

d. $x = 0$

e. $x = 1$

23. Identify the solution set of the quadratic inequality $-x^2 - 2x + 3 \leq 0$ by inspecting its graph.

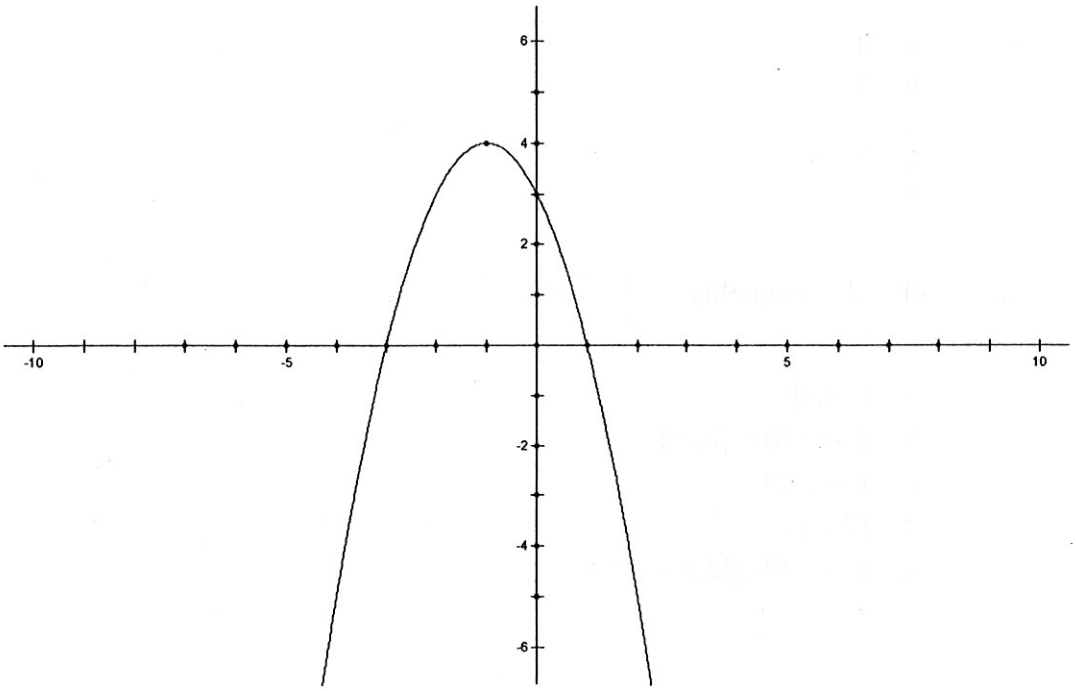
a. $[-3,1]$

b. $[-3,\infty)$

c. $(-\infty,1]$

d. $[-3,1]$

e. $(-\infty,-3] \cup [1,\infty)$



24. Axis of symmetry and vertex of the parabola $f(x) = -x^2 - 2x + 3$ are

a. *Vertex* $= (-1,4)$ and *Axis of symmetry*: *line* $x = -1$

b. *Vertex* $= (-1,4)$ and *Axis of symmetry*: *line* $y = -1$

c. *Vertex* $= (-1,4)$ and *Axis of symmetry*: *line* $y = 4$

d. *Vertex* $= (-1,4)$ and *Axis of symmetry*: *line* $x = 1$

e. *Vertex* $= (4,-1)$ and *Axis of symmetry*: *line* $x = -1$

25. If $x = 2$ is a zero of $f(x) = x^3 - 14x^2 + 59x - 70$. find all the other zeros of $f(x)$.

a. $x = -7$ and $x = -5$

b. $x = 7$ and $x = -5$

c. $x = -7$ and $x = 5$

d. $x = 7$ and $x = 5$

e. none of the above

26. The function $f(x) = \dfrac{x^2}{x-1}$ is

a. even

b. odd

c. neither even nor odd

d. it is defined at 1

e. defined for all real numbers

27. If $f(x) = (x-1)^3$ and $g(x) = \sqrt[3]{x} + 2$, $(g \circ f)(x)$ is

a. $(g \circ f)(x) = (\sqrt[3]{x} + 1)^3$

b. $(g \circ f)(x) = x + 1$

c. $(g \circ f)(x) = x - 1$

d. $(g \circ f)(x) = \sqrt[3]{x} + 1$

e. $(g \circ f)(x) = (x-1)^2$

28. Give the algebraic expression for $\cos(\sin^{-1}(x))$. Here $\sin^{-1}(x)$ stands for the compositional inverse of $\sin(x)$.

a. $\sqrt{1-x^2}$

b. $\sqrt{1+x^2}$

c. $\sqrt{x^2-1}$

d. $x^2 + 1$

e. $1 - x^2$

29. Which of the following expressions is equal to $\cos(\alpha + \frac{\pi}{4})$?(Angles are measured in radians)

a. $\frac{\sin(\alpha) + \cos(\alpha)}{\sqrt{2}}$

b. $\frac{\sin(\alpha) - \cos(\alpha)}{\sqrt{2}}$

c. $\frac{\cos(\alpha) - \sin(\alpha)}{\sqrt{2}}$

d. $\frac{\sin(\alpha) - \cos(\alpha)}{2}$

e. $\frac{\sin(\alpha) + \cos(\alpha)}{2}$

30. Determine the amplitude, period, and phase shift of $f(x) = 4\sin(2x - 2\pi)$.
(Angles are measured in radians)

a. *Amplitude*: 2 and *Period*: 2π and *Phase shift:* 2π
b. *Amplitude*: 4 and *Period*: π and *Phase shift:* π
c. *Amplitude*: 2 and *Period*: π and *Phase shift:* 2π
d. *Amplitude*: 2 and *Period*: 2 and *Phase shift:* π
e. *Amplitude*: 4 and *Period*: 2π and *Phase shift:* 2π

31. Find the exact value of $\cot(\sin^{-1}(\sqrt{2}/2))$.

a. $\pi/4$
b. $-\pi/4$
c. 0
d. -1
e. 1

32. $\sin 2k \cos k + \cos 2k \sin k$ is equal to

a. $\cos 3k$
b. $\cos k$
c. $\sin k$
d. $\sin 3k$
e. $\cos 6k$

33. Find the general solution of the equation $\cos(x)=\frac{1}{2}$.

a. $x=\frac{\pi}{3}+k2\pi$

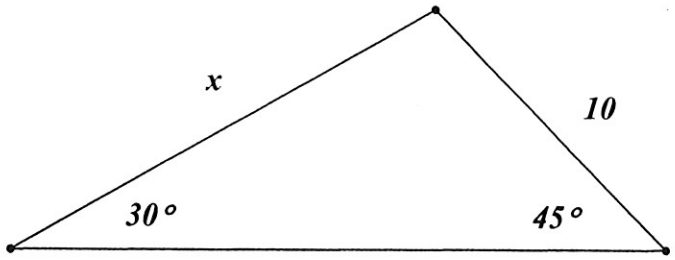
b. $x=\frac{5\pi}{3}+k2\pi$

c. $x=\frac{\pi}{3}+k2\pi,\ x=\frac{5\pi}{3}+k2\pi$

d. $x=\frac{\pi}{6}+k2\pi,\ x=\frac{11\pi}{6}+k2\pi$

e. $x=\frac{\pi}{3}+k\pi,\ x=\frac{5\pi}{3}+k\pi$

34. Find the value of x in the following triangle. Round your answer to two decimal places.



a. $10\sqrt{2}$

b. $5\sqrt{2}$

c. $5/\sqrt{2}$

d. $10/\sqrt{2}$

e. $\sqrt{2}/10$

35. Use the trigonometric identities to simplify the expression $\frac{1-\cos(2\theta)}{1+\cos(2\theta)}$

a. $\tan^2(\theta)$

b. $\frac{2\sin(\theta)}{\cos(\theta)}$

c. $\frac{1-\cos(\theta)}{1+\cos(\theta)}$

d. 1

e. $\tan(\theta)$