

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Write an equation for the line described.**

- 1) Passes through (1, -5) and perpendicular to the line  $-7x - 5y = 18$  1) \_\_\_\_\_  
 A)  $y = \frac{5}{7}x$       B)  $y = \frac{7}{5}x - 40$       C)  $y = \frac{5}{7}x - \frac{40}{7}$       D)  $y = -\frac{5}{7}x - \frac{40}{7}$

**Solve the problem.**

- 2) The paired data below consist of the temperatures on randomly chosen days and the amount a certain kind of plant grew (in millimeters). Find the linear regression equation for the data. 2) \_\_\_\_\_

Temp (x)	62	76	50	51	71	46	51	44	79
Growth (y)	36	39	50	13	33	33	17	6	16

- A)  $y = 0.122x + 7.30$       B)  $y = -0.211x - 14.6$   
 C)  $y = -0.112x + 7.30$       D)  $y = 0.211x + 14.6$

**Find the domain and range.**

- 3)  $y = -1 - x^2$  3) \_\_\_\_\_  
 A) Domain:  $(-\infty, \infty)$ , Range:  $[-1, \infty)$       B) Domain:  $(-\infty, \infty)$ , Range:  $(-\infty, \infty)$   
 C) Domain:  $(-\infty, \infty)$ , Range:  $(-\infty, -1]$       D) Domain:  $(-\infty, -1]$ , Range:  $(-\infty, \infty)$

- 4)  $y = -2 + \sqrt{x}$  4) \_\_\_\_\_  
 A) Domain:  $(-\infty, \infty)$ , Range:  $[-2, \infty)$       B) Domain:  $[0, \infty)$ , Range:  $[-2, \infty)$   
 C) Domain:  $[0, \infty)$ , Range:  $(-\infty, \infty)$       D) Domain:  $(-\infty, 0]$ , Range:  $(-\infty, -2]$

- 5)  $f(x) = \frac{7}{4-x}$  5) \_\_\_\_\_  
 A) Domain:  $(-\infty, 4) \cup (4, \infty)$ ; Range:  $(-\infty, \infty)$   
 B) Domain:  $(-\infty, \infty)$ ; Range:  $(-\infty, \infty)$   
 C) Domain:  $(-\infty, 4) \cup (4, \infty)$ ; Range:  $(-\infty, 0) \cup (0, \infty)$   
 D) Domain:  $(-\infty, \infty)$ ; Range:  $(-\infty, 0) \cup (0, \infty)$

- 6)  $y = \frac{-4}{\sqrt{x+1}}$  6) \_\_\_\_\_  
 A) Domain:  $[0, \infty)$ , Range:  $(-\infty, \infty)$       B) Domain:  $(-\infty, -1)$ , Range:  $(0, \infty)$   
 C) Domain:  $[1, \infty)$ , Range:  $(-\infty, \infty)$       D) Domain:  $(-1, \infty)$ , Range:  $(-\infty, 0)$

**Determine if the function is even, odd, or neither.**

- 7)  $y = \frac{3}{x^2 - 6}$  7) \_\_\_\_\_  
 A) Even      B) Odd      C) Neither

- 8)  $y = 9x^5 - 7x^3$  8) \_\_\_\_\_  
 A) Even      B) Odd      C) Neither

9)  $y = \frac{-4}{x+7}$

9) \_\_\_\_\_

A) Even

B) Odd

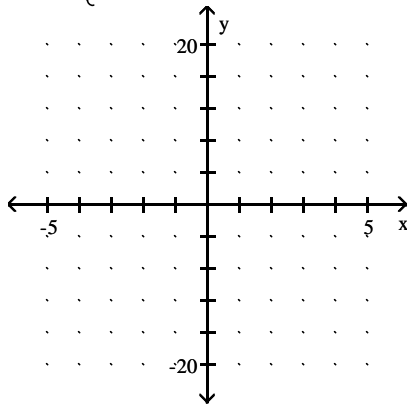
C) Neither

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Graph the piecewise-defined function.**

10)  $f(x) = \begin{cases} 3x^2, & \text{for } x \leq -1, \\ 3, & \text{for } -1 < x \leq 1, \\ 3x + 1, & \text{for } x > 1 \end{cases}$

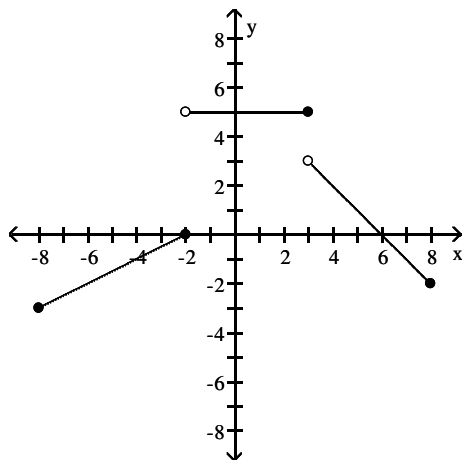
10) \_\_\_\_\_



**Find a formula for the function graphed.**

11)

11) \_\_\_\_\_



**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Solve the problem.**

12) If  $f(x) = 4x^2 + 4x + 6$  and  $g(x) = 4x - 3$ , find  $g(f(x))$ .

12) \_\_\_\_\_

A)  $16x^2 + 16x + 27$

B)  $16x^2 + 16x + 21$

C)  $4x^2 + 4x + 3$

D)  $4x^2 + 16x + 21$

13) If  $f(x) = -2x + 2$  and  $g(x) = -4x^2 - 7x - 8$ , find  $g(f(5))$ .

13) \_\_\_\_\_

A) 128

B) 80

C) 288

D) -208

- 14) If  $(f \circ g)(x) = x + 2$  and  $g(x) = \sqrt{x - 1}$ , find  $f(x)$ . 14) \_\_\_\_\_
- A)  $f(x) = x^2 + 2x + 3$                       B)  $f(x) = x^2$   
 C)  $f(x) = x^2 + 3$                               D)  $f(x) = x^2 - 3$

- 15) The table shows the total stopping distance of a sport utility vehicle as a function of its speed. 15) \_\_\_\_\_  
 Use the quadratic regression equation for the data to predict the average total stopping distance for a speed of 73 miles per hour.

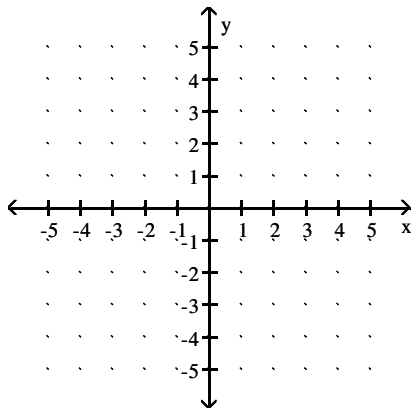
Speed (mph)	Average total stopping distance (ft)
20	47
25	61.5
30	78.5
35	97
40	122
45	149
50	180
55	216.5
60	254
65	298.5
70	350
75	408
80	473

- A) 375.07 ft                      B) 408.43 ft                      C) 397.13 ft                      D) 386.01 ft

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

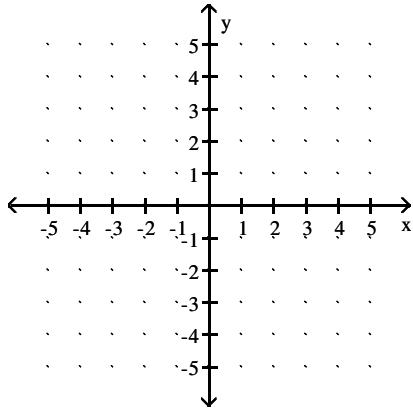
**Graph the exponential function without the aid of a calculator.**

- 16)  $y = 2 \cdot 0.5^x - 4$  16) \_\_\_\_\_



17)  $y = 2^{-x} - 3$

17) \_\_\_\_\_



**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Rewrite the exponential expression to have the indicated base.**

- 18)  $\left(\frac{1}{4}\right)^{2x}$ ; base 2 18) \_\_\_\_\_
- A)  $2^{-4x}$                       B)  $2^{-8x}$                       C)  $2^{-5x}$                       D)  $2^{4x}$

**Use your grapher to find the zero of the function. Round your answer to three decimal places.**

- 19)  $f(x) = 9 - 2^x$  19) \_\_\_\_\_
- A) 3.17                      B) 3.195                      C) 3.136                      D) 3.151

**Solve the problem.**

- 20) A certain radioactive isotope has a half-life of approximately 1850 years. How many years to the nearest year would be required for a given amount of this isotope to decay to 40% of that amount? 20) \_\_\_\_\_
- A) 2446 years                      B) 1110 years                      C) 1363 years                      D) 2406 years
- 21) There are currently 50 million cars in a certain country, decreasing by 1.8% annually. How many years will it take for this country to have 27 million cars? Round to the nearest year. 21) \_\_\_\_\_
- A) 3 years                      B) 174 years                      C) 13 years                      D) 34 years

**Find a Cartesian equation for the curve.**

- 22)  $x = \sqrt{t}, y = 2t + 5$  22) \_\_\_\_\_
- A)  $y = 2\sqrt{x} + 5, x \geq 0$                       B)  $y = 2\sqrt{x} - 5, x \geq 0$
- C)  $y = 2x^2 + 5$                       D)  $y = 2x^2 - 5$
- 23)  $x = 9 \cos t, y = 9 \sin t$  23) \_\_\_\_\_
- A)  $x^2 + y^2 = 9$                       B)  $x^2 + y^2 = 81$                       C)  $(x + y)^2 = 81$                       D)  $y = x \tan t$

**Find the inverse of the function.**

24)  $f(x) = x^3 + 6$

A)  $f^{-1}(x) = \sqrt[3]{x} - 6$

C)  $f^{-1}(x) = \sqrt[3]{x+6}$

B)  $f^{-1}(x) = \sqrt[3]{x-6}$

D) Not a one-to-one function

24) \_\_\_\_\_

25)  $f(x) = \frac{-4x+6}{-3x-8}$

A) Not a one-to-one function

C)  $f^{-1}(x) = \frac{8x+6}{-3x+4}$

B)  $f^{-1}(x) = \frac{-4x+6}{-3x-8}$

D)  $f^{-1}(x) = \frac{-3x+4}{8x+6}$

25) \_\_\_\_\_

**Solve the equation.**

26)  $e^{0.54t} = 20$

A)  $t = \frac{\ln 21}{0.54}$

B)  $t = \frac{\ln 20}{0.54}$

C)  $t = \frac{0.54}{\ln 20}$

D)  $t = 0.54 \ln 20$

26) \_\_\_\_\_

27)  $2^x + 2^{-x} = 3$

A)  $x = \log_2 \left( \frac{5 \pm \sqrt{7}}{4} \right)$

C)  $x = \log_2 \left( \frac{3 \pm \sqrt{5}}{2} \right)$

B)  $x = \log_2 \left( \frac{\sqrt{5}}{2} \right)$

D)  $x = \log \left( \frac{3\sqrt{5}}{2} \right)$

27) \_\_\_\_\_

28)  $e^x + e^{-x} = 3$

A)  $x = -\ln(3 \pm \sqrt{5})$

C)  $x = -\ln \left( \frac{3 \pm \sqrt{5}}{2} \right)$

B)  $x = \ln \left( \frac{3 \pm \sqrt{5}}{2} \right)$

D)  $x = \ln(3 \pm \sqrt{5})$

28) \_\_\_\_\_

29)  $\ln(y+6) - \ln 4 = x + \ln x$  ; Solve for y.

A)  $y = xe^{4x} + 6$

B)  $y = xe^{6x} + 4$

C)  $y = 4xe^x - 6$

D)  $y = 6xe^{-x} - 7$

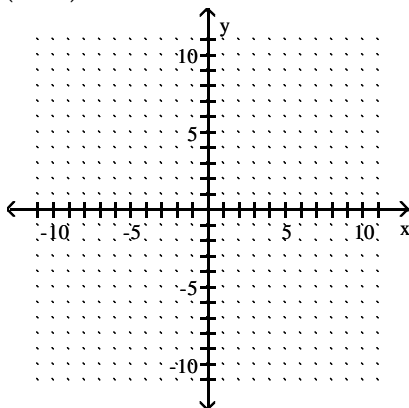
29) \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Graph the function.**

30)  $f(x) = \ln(x - 3)$

30) \_\_\_\_\_



**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Solve the problem.**

31) A certain radioactive isotope has a half-life of approximately 1500 years. How many years to the nearest year would be required for a given amount of this isotope to decay to 60% of that amount? 31) \_\_\_\_\_

- A) 1983 years                      B) 600 years                      C) 1045 years                      D) 1105 years

32) How long will it take for the population of a certain country to double if its annual growth rate is 2.9%? Round to the nearest year. 32) \_\_\_\_\_

- A) 69 years                      B) 1 year                      C) 10 years                      D) 24 years

33) How long will it take for prices in the economy to double at a 7% annual inflation rate? 33) \_\_\_\_\_

- A) 10.24 years                      B) 16.24 years                      C) 23.45 years                      D) 9.01 years

**Find the value of the expression.**

34) Let  $\log_b A = 5$  and  $\log_b B = -2$ . Find  $\log_b 5\sqrt{AB}$ . 34) \_\_\_\_\_

- A)  $5\sqrt{-10}$                       B) 0.600                      C) 1.585                      D) -1.585

**Express y as a function of x. The constant C is a positive number.**

35)  $\ln y = \ln 4x + \ln C$  35) \_\_\_\_\_

- A)  $y = x + 4C$                       B)  $y = (4x)^C$                       C)  $y = 4Cx$                       D)  $y = 4x + C$

**Express as a single logarithm.**

36)  $(\log_a x - \log_a y) + 6\log_a z$  36) \_\_\_\_\_

- A)  $\log_a \frac{xz^6}{y}$                       B)  $\log_a \frac{6xz}{y}$                       C)  $\log_a \frac{x}{z^6y}$                       D)  $\log_a xz^6y$

37)  $3 \log_a (2x + 1) - 2 \log_a (2x - 1) + 2$

37) \_\_\_\_\_

A)  $\log_a (2x + 1) + 2$

B)  $\log_a \frac{a^2(2x + 1)^3}{(2x - 1)^2}$

C)  $\log_a 2(x + 1)$

D)  $\log_a (2x + 3)$

**Solve the equation.**

38)  $\frac{1}{3} \log_2 (x + 6) = \log_8 (3x)$

38) \_\_\_\_\_

A) {3, 0}

B)  $\emptyset$

C) {3}

D) {9}

**Find the requested function value meeting all of the given conditions.**

39)  $\cos \theta = -\frac{1}{2}$  and  $\sin \theta < 0$ ; Find  $\csc \theta$ .

39) \_\_\_\_\_

A)  $-\frac{\sqrt{3}}{2}$

B)  $\frac{\sqrt{2}}{2}$

C)  $-\frac{2\sqrt{3}}{3}$

D)  $\frac{2\sqrt{3}}{2}$

**Find the requested value or interval.**

40) Find the range of the function  $y = 4 \sin \left( 3x + \frac{\pi}{3} \right) + 2$

40) \_\_\_\_\_

A) [-4, 0]

B) [-4, 4]

C) [-1, 7]

D) [-2, 6]

41) Find the amplitude of  $y = -5 \cos (3x - \pi)$ .

41) \_\_\_\_\_

A)  $\pi$

B) -15

C) 5

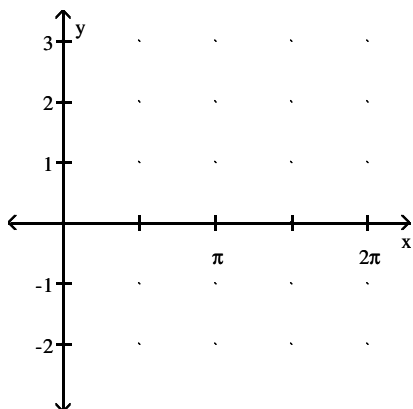
D) -5

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Graph the function.**

42)  $y = 2 \cos \left( 3x - \frac{\pi}{4} \right)$ , over the interval  $[0, 2\pi]$ .

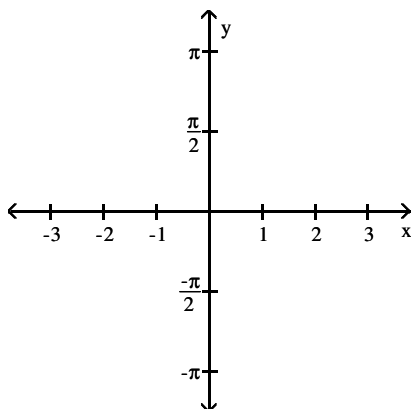
42) \_\_\_\_\_



Graph the inverse of the function.

43)  $y = \tan x, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

43) \_\_\_\_\_



**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

Find the exact value of the real number  $y$ .

44)  $y = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$

44) \_\_\_\_\_

A)  $\frac{11\pi}{6}$

B)  $\frac{\pi}{6}$

C)  $\frac{\pi}{4}$

D)  $\frac{7\pi}{4}$

45)  $y = \tan^{-1}(-1)$

45) \_\_\_\_\_

A)  $\frac{\pi}{4}$

B)  $\frac{3\pi}{4}$

C)  $\frac{7\pi}{4}$

D)  $\frac{5\pi}{4}$

46)  $y = \sin^{-1}(0.5)$

46) \_\_\_\_\_

A)  $\frac{\pi}{3}$

B)  $\frac{\pi}{6}$

C)  $-\frac{\pi}{3}$

D)  $-\frac{\pi}{6}$

47)  $y = \arcsin\left(-\frac{\sqrt{3}}{2}\right)$

47) \_\_\_\_\_

A)  $\frac{7\pi}{6}$

B)  $\pi$

C)  $-\frac{\pi}{3}$

D)  $\frac{\pi}{3}$

Find  $\theta$  to four significant digits for  $0 \leq \theta < 2\pi$ .

48)  $\sin \theta = 0.6055$

48) \_\_\_\_\_

A) 0.9204, 5.363

B) 0.6504, 5.633

C) 0.6504, 2.491

D) 0.6504

49)  $\cos \theta = 0.7977$

49) \_\_\_\_\_

A) 0.6473, 3.789

B) 0.6473, 5.636

C) 0.6473, 2.494

D) 0.9235, 4.065



Complete the identity.

50)  $\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = ?$  50) \_\_\_\_\_

- A)  $-2 \tan^2 \theta$       B)  $\sec \theta \csc \theta$       C)  $1 + \cot \theta$       D)  $\sin \theta \tan \theta$

51)  $2 \tan \theta - (1 + \tan \theta)^2 = ?$  51) \_\_\_\_\_

- A) 1      B) 0      C)  $1 - \sin \theta$       D)  $-\sec^2 \theta$

52)  $\tan^4 \theta - \sec^4 \theta = ?$  52) \_\_\_\_\_

- A)  $\sec^2 \theta$       B)  $\tan^2 \theta - \sec^2 \theta$       C)  $\sec^2 \theta + \tan^2 \theta$       D)  $-2 \tan^2 \theta - 1$

Use a right triangle to write the expression as an algebraic expression. Assume that  $v$  is positive and in the domain of the given inverse trigonometric function.

53)  $\sin(\tan^{-1} v)$  53) \_\_\_\_\_

- A)  $\frac{v\sqrt{v^2-1}}{v^2-1}$       B)  $\frac{v\sqrt{v^2+1}}{v^2+1}$       C)  $\frac{\sqrt{v^2+1}}{v^2+1}$       D)  $v\sqrt{v^2+1}$

Complete the identity.

54)  $\sin(\alpha + \beta) \cos \beta - \cos(\alpha + \beta) \sin \beta$  54) \_\_\_\_\_

- A)  $\sin \alpha \cos^2 \beta - \sin \alpha \sin^2 \beta$       B)  $\sin \alpha \cos \beta - \cos \alpha \sin \beta$   
C)  $2 \sin \beta \cos \beta (\sin \alpha - \cos \alpha)$       D)  $\sin \alpha$

Find the exact value of the expression.

55)  $\cos\left(\tan^{-1} \frac{4}{3} - \sin^{-1} \frac{3}{5}\right)$  55) \_\_\_\_\_

- A)  $\frac{2\sqrt{3}}{5}$       B)  $\frac{24}{25}$       C) 1      D)  $\frac{2\sqrt{6}}{5}$

Complete the identity.

56)  $\sin(2\theta) \tan \theta + \cos(2\theta) = ?$  56) \_\_\_\_\_

- A)  $\sec(2\theta)$       B)  $\cos(3\theta)$       C) 1      D)  $2 \cos(2\theta)$

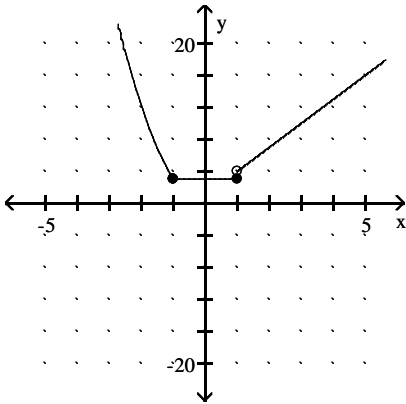
57)  $\sin \frac{\theta}{2} \cos \frac{\theta}{2} = ?$  57) \_\_\_\_\_

- A)  $\frac{1 + \sin \theta}{2}$       B)  $\frac{1}{2} \sin \theta$       C)  $\frac{1 - \cos \theta}{2}$       D)  $\frac{1}{2} \cos \theta$

Answer Key

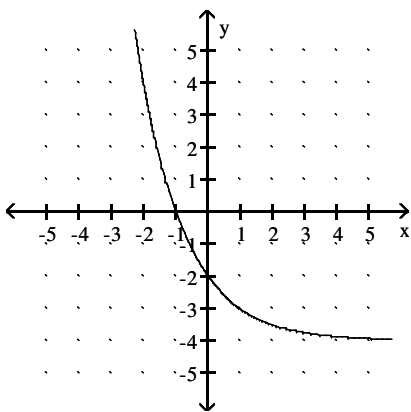
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- 1) C
- 2) D
- 3) C
- 4) B
- 5) C
- 6) D
- 7) A
- 8) B
- 9) C
- 10)



$$11) f(x) = \begin{cases} \frac{1}{2}x + 1, & -8 \leq x \leq -2 \\ 5, & -2 < x \leq 3 \\ 6 - x, & 3 < x \leq 8 \end{cases}$$

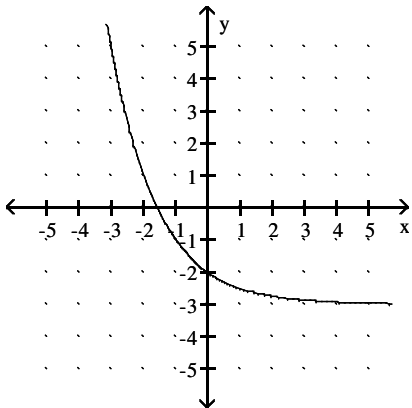
- 12) B
- 13) D
- 14) C
- 15) D
- 16)



Answer Key

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17)



18) A

19) A

20) A

21) D

22) C

23) B

24) B

25) C

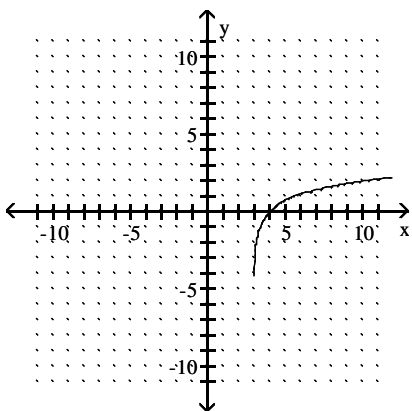
26) B

27) C

28) B

29) C

30)



31) D

32) D

33) A

34) B

35) C

36) A

37) B

38) C

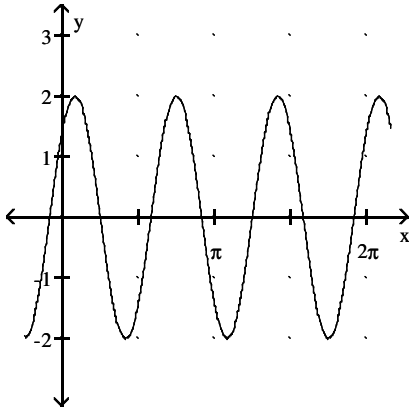
39) C

40) D

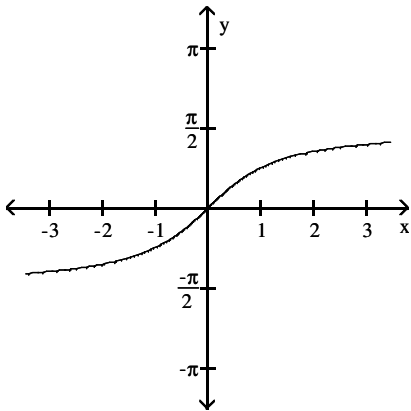
41) C

Answer Key  
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42)



43)



- 44) C
- 45) B
- 46) B
- 47) C
- 48) C
- 49) B
- 50) B
- 51) D
- 52) D
- 53) B
- 54) D
- 55) B
- 56) C
- 57) B