

## Algebra- Trigonometry

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

**Factor the polynomial completely. If a polynomial cannot be factored, state that it is prime.**

- 1)  $3x^3 + 3x^2 - 36x$  1) \_\_\_\_\_  
 A)  $3x(x-3)(x+4)$  B)  $(3x^2+9x)(x-4)$  C)  $3x(x+3)(x-4)$  D) prime

**Evaluate as requested.**

- 2) Given that  $f(x) = x^2 + 5x + 1$ , find  $f(-4)$ . 2) \_\_\_\_\_  
 A) 35 B) 37 C) -5 D) -3

- 3) Given that  $f(x) = 2|x| + 4x$ , find  $f(2y)$ . 3) \_\_\_\_\_  
 A)  $4|y| + 8y$  B)  $3|y| + 10y$  C)  $2|y| + 4y$  D)  $2|y| + 2y$

**Determine whether the given function is even, odd, or neither.**

- 4)  $f(x) = 2x^2 - 5$  4) \_\_\_\_\_  
 A) Even B) Odd C) Neither

- 5)  $f(x) = \frac{x}{x^2 + 2}$  5) \_\_\_\_\_  
 A) Even B) Odd C) Neither

- 6)  $f(x) = 8x^5 + 2x^3$  6) \_\_\_\_\_  
 A) Even B) Odd C) Neither

**Find the composite function for the given functions.**

- 7)  $(g \circ f)(c)$  when  $f(x) = -6x + 6$  and  $g(x) = 3x + 9$ . 7) \_\_\_\_\_  
 A)  $18c + 27$  B)  $-18c + 60$  C)  $-18c + 27$  D)  $-18c - 9$

- 8)  $f \circ g$  for  $f(x) = \frac{7}{x-4}$  and  $g(x) = \frac{2}{5x}$  8) \_\_\_\_\_  
 A)  $\frac{35x}{2+20x}$  B)  $\frac{2x-8}{35x}$  C)  $\frac{7x}{2-20x}$  D)  $\frac{35x}{2-20x}$

**Determine whether the given function is one-to-one. If it is one-to-one, find its inverse.**

- 9)  $f(x) = 8 - x$  9) \_\_\_\_\_  
 A)  $f^{-1}(x) = 8 - x$  B)  $f^{-1}(x) = x - 8$  C)  $f^{-1}(x) = x + 8$  D)  $f^{-1}(x) = \frac{x}{8}$

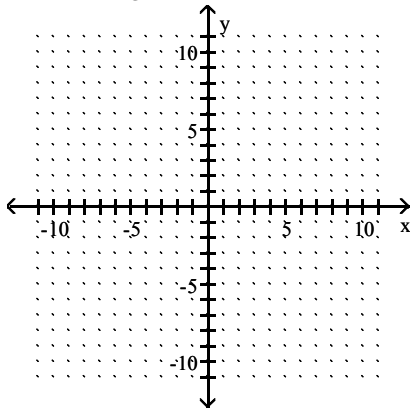
**Evaluate the exponential function for the given value.**

- 10)  $f(x) = 5 - 5^{-x}$ ,  $f(3)$  10) \_\_\_\_\_  
 A)  $\frac{624}{125}$  B)  $\frac{2}{5}$  C)  $\frac{4}{125}$  D)  $\frac{626}{125}$

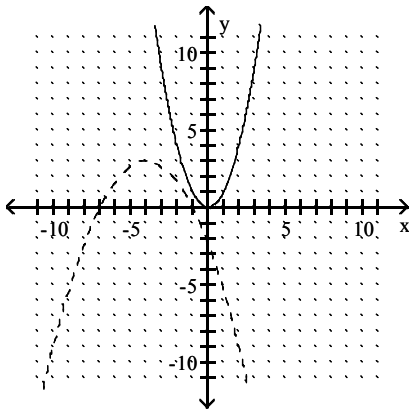
**Graph the pair of functions on the same coordinate plane. Use a dashed line for  $g(x)$ .**

11)  $f(x) = x^2$ ,  $g(x) = -3(x + 4)^2 + 3$

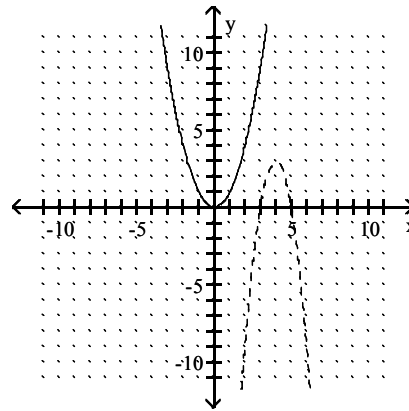
11) \_\_\_\_\_



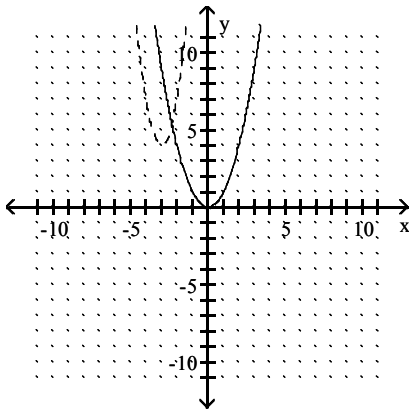
A)



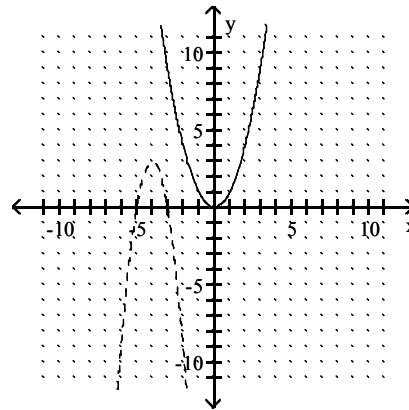
B)



C)



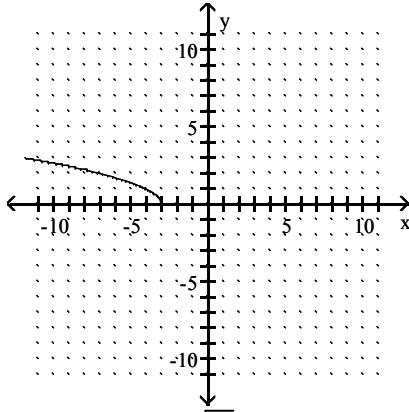
D)



Determine the domain and range of the function from the graph.

12)

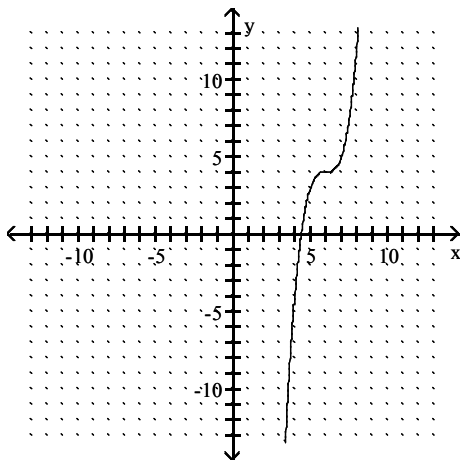
12) \_\_\_\_\_



- A) Domain:  $(\sqrt{-3}, \infty)$ ; Range:  $(-\infty, 0]$
- B) Domain:  $(-\infty, \infty)$ ; Range:  $[0, \infty)$
- C) Domain:  $(-\infty, -3]$ ; Range:  $[0, \infty)$
- D) Domain:  $(-\infty, -3) \cup (-3, \infty)$ ; Range:  $(-\infty, 0) \cup (0, \infty)$

13)

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



- A) Domain:  $[0, \infty)$ ; Range:  $[0, \infty)$
- B) Domain:  $(-\infty, \infty)$ ; Range:  $[4, \infty)$
- C) Domain:  $[6, \infty)$ ; Range:  $(-\infty, \infty)$
- D) Domain:  $(-\infty, \infty)$ ; Range:  $(-\infty, \infty)$

Using the given zero, find all other zeros of  $f(x)$ .

14)  $i$  is a zero of  $f(x) = x^4 - 4x^3 + 2x^2 - 4x + 1$

14) \_\_\_\_\_

- A)  $-i, -2 + \sqrt{3}, -2 - \sqrt{3}$
- B)  $-i, 2 + 2\sqrt{3}, 2 - 2\sqrt{3}$
- C)  $-i, 2 + \sqrt{3}, 2 - \sqrt{3}$
- D)  $-i, 1 + \sqrt{3}, 1 - \sqrt{3}$

15)  $4 + 3i$  is a zero of  $f(x) = x^4 - 12x^3 + 61x^2 - 132x + 100$ .

15) \_\_\_\_\_

- A)  $-4 + 3i, 2, \text{ and } -2$
- B)  $4 - 3i, 2, \text{ and } -2$
- C)  $4 - 3i, 2$
- D)  $4 - 3i, -2$

Solve the problem.

16) The number of bacteria growing in an incubation culture increases with time according to  $n(t) = 3400(4)^t$ , where  $t$  is time in days. After how many days will the number of bacteria in the culture be 54,400?

16) \_\_\_\_\_

- A) 1 day
- B) 2 days
- C) 10 days
- D) 6 days

**Solve the equation.**

17)  $3^{(9 - 3x)} = 27$  17) \_\_\_\_\_  
A) 9 B) 2 C) 3 D) -2

18)  $e^{2x} - 1 = (e^4)^{-x}$  18) \_\_\_\_\_  
A)  $\frac{5}{3}$  B)  $\frac{1}{6}$  C)  $-\frac{1}{2}$  D) 0

**Evaluate the expression without a calculator.**

19)  $\log_8 \frac{1}{512}$  19) \_\_\_\_\_  
A) 8 B)  $\frac{1}{3}$  C) -3 D) 24

20)  $\ln e^{-8}$  20) \_\_\_\_\_  
A)  $-\frac{1}{8}$  B)  $e \ln -8$  C) 1 D) -8

**Evaluate.**

21) Let  $\log_b A = 3.262$  and  $\log_b B = 0.18$ . Find  $\log_b \frac{A}{B}$ . 21) \_\_\_\_\_  
A) 0.580 B) 3.262 C) 3.084 D) 3.440

22) Let  $\log_b A = 1.163$  and  $\log_b B = 0.345$ . Find  $\log_b AB$ . 22) \_\_\_\_\_  
A) 1.508 B) 3.374 C) 0.818 D) 0.401

**Write the expression in expanded form.**

23)  $\log \frac{x^9 z}{y^2}$  23) \_\_\_\_\_  
A)  $9 \log x \cdot \log z - 2 \log y$  B)  $\log(9x + z) - 2 \log y$   
C)  $9 \log x + \log z - 2 \log y$  D)  $(\log x)^9 + \log z - (\log y)^2$

24)  $\log_a x^2 y z^3$  24) \_\_\_\_\_  
A)  $(\log_a x)^2 + \log_a y + (\log_a z)^3$  B)  $2 \log_a x \cdot \log_a y \cdot 3 \log_a z$   
C)  $2 \log_a x + \log_a y + 3 \log_a z$  D)  $\log_a 2x + \log_a y + \log_a 3z$

**Solve the equation.**

25)  $4^x = 256$  25) \_\_\_\_\_  
A) 5 B) 64 C) 4 D) 3

26)  $\log_7 x = 5$  26) \_\_\_\_\_  
A) 78,125 B) 35 C) 10,000,000 D) 16,807

**Solve the logarithmic equation.**

27)  $\ln x - \ln(x - 3) = \ln 3$

A) 0

B)  $\frac{9}{2}$

C)  $\frac{3 \ln 3}{\ln 3 - 1}$

D)  $\emptyset$

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

**Simplify the expression using the product and quotient properties of square roots. Assume that any variables represent positive real numbers.**

28)  $\sqrt[3]{162x^3}$

A)  $3x\sqrt[3]{6}$

B)  $5x$

C)  $12x$

D)  $6x\sqrt[3]{3}$

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

29)  $-\sqrt[4]{324}$

A) -4

B) 4

C)  $-3\sqrt[4]{4}$

D)  $-4\sqrt[4]{3}$

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

**Simplify the expression, leaving your answer with only positive exponents. Assume that all variables represent positive numbers.**

30)  $(27x^6y^6)^{1/3}$

A)  $x^2y^2$

B)  $3x^6y^2$

C)  $3x^2y$

D)  $3x^2y^2$

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

31)  $z^{-2/5} \cdot z^{3/5}$

A)  $z^{-1/5}$

B)  $z^{1/5}$

C)  $z^{6/5}$

D)  $z^{5/6}$

31) \_\_\_\_\_

32)  $\frac{y^{9/8}}{y^{5/8}}$

A)  $y^{9/8}$

B)  $\frac{1}{y}$

C)  $y^{1/2}$

D)  $y$

32) \_\_\_\_\_

**Convert the radical expression to its rational exponent form and then simplify. Assume that all variables represent positive numbers.**

33)  $\sqrt[8]{16x^4}$

A)  $2^{1/2}x^{1/2}$

B)  $\frac{1}{4x}$

C)  $2^{1/8}x^{1/8}$

D)  $2^{1/4}x^{1/4}$

33) \_\_\_\_\_

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

**Use the correct formula to solve. Round to the nearest cent.  $A = P(1 + \frac{r}{k})^{kt}$  or  $A = Pe^{rt}$**

34) To get \$2000 after 11 years at 6% compounded semiannually

34) \_\_\_\_\_

35) What principal invested at 5.5% compounded continuously for 3 years will yield \$1700?  
Round the answer to two decimal places.

35) \_\_\_\_\_

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

Find the length of the arc on the circle of radius  $r$  meters intercepted by a central angle  $\theta$ . Round your answer to three decimal places.

36)  $r = 7, \theta = 70^\circ$

A) 8.552 m

B) 9.407 m

C) 6.842 m

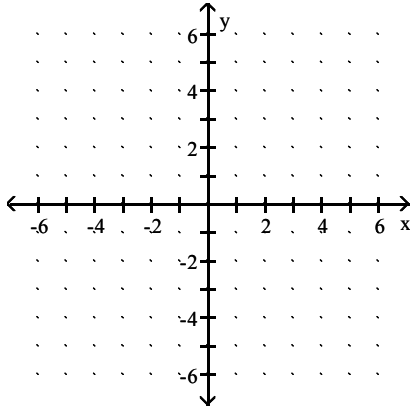
D) 7.697 m

36) \_\_\_\_\_

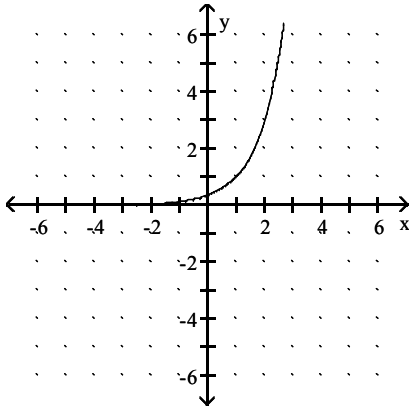
**Graph the function.**

37)  $f(x) = \log_3(x - 1)$

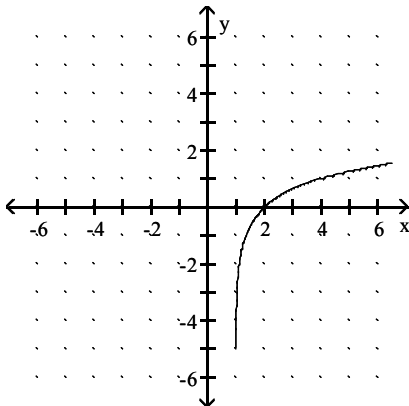
37) \_\_\_\_\_



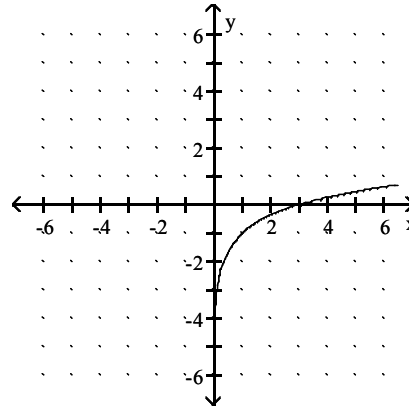
A)



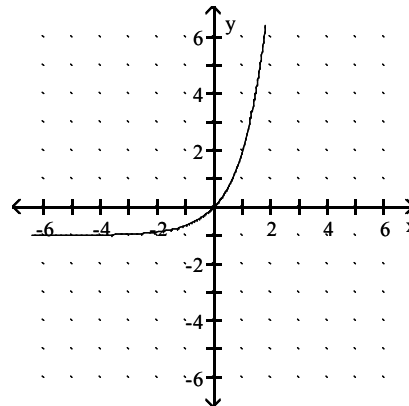
C)



B)

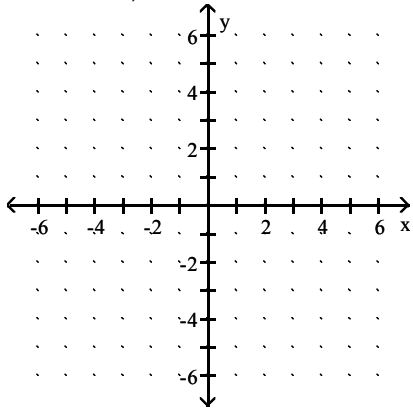


D)

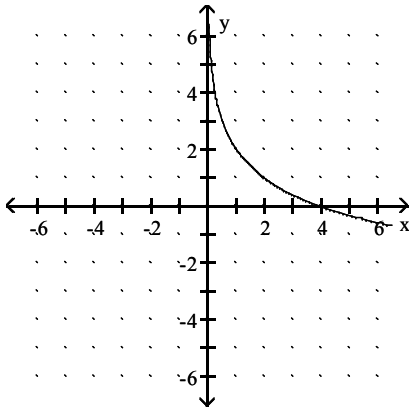


38)  $f(x) = \log_{1/2}(x + 2)$

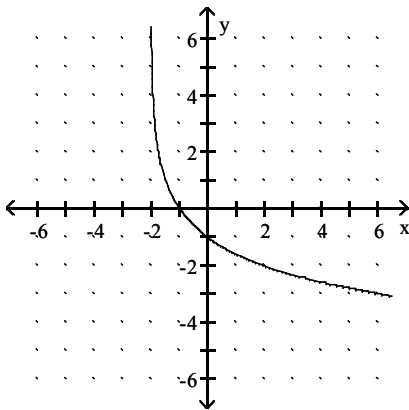
38) \_\_\_\_\_



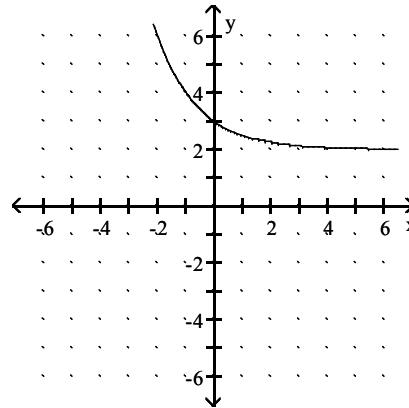
A)



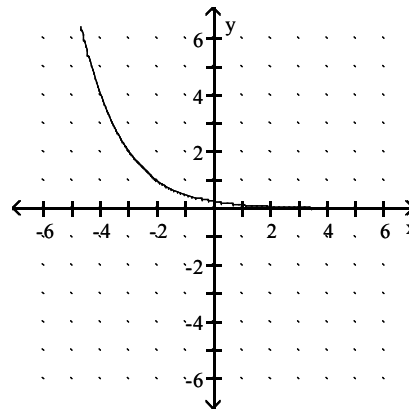
C)



B)



D)



Convert the angle from radians to degrees.

39)  $\frac{10\pi}{9}$

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

A)  $200^\circ$

B)  $201^\circ$

C)  $199^\circ$

D)  $202^\circ$

Convert the angle from degrees to radians. Express the answer as a multiple of  $\pi$ .

40)  $590^\circ$

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

A)  $\frac{59\pi}{36}$

B)  $\frac{59\pi}{9}$

C)  $\frac{23\pi}{18}$

D)  $\frac{59\pi}{18}$

Find the exact value of the expression.

41)  $\sin 315^\circ$

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

B)  $-\frac{1}{2}$

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

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

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

42)  $\cot 240^\circ$

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

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

C)  $-2$

D)  $1$

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

43)  $\csc 120^\circ$

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

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

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

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

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

Find the amplitude, period, or phase shift of the given function as requested.

44) Find the phase shift of  $y = -2 \sin \left( x - \frac{\pi}{4} \right)$

A)  $2$

B)  $-2$

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

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

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

45) Find the amplitude of  $y = -4 \cos \left( x + \frac{\pi}{2} \right)$

A)  $-\frac{\pi}{2}$

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

C)  $4$

D)  $-4$

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

46) Find the period of  $y = 4 \cos 3 \left( x + \frac{\pi}{2} \right)$ .

A)  $\pi$

B)  $\frac{2\pi}{3}$

C)  $\frac{\pi}{2}$

D)  $4$

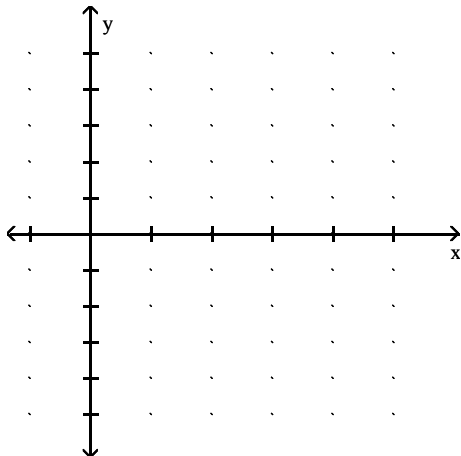
46) \_\_\_\_\_

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

Graph the function over a one-period interval.

47)  $y = 5 \sin \left( x + \frac{\pi}{2} \right)$

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





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

**Find the exact value of  $y$ , or state that  $y$  is undefined.**

48)  $y = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$  48) \_\_\_\_\_

- A)  $\frac{3\pi}{4}$                       B)  $-\frac{\pi}{3}$                       C)  $\frac{\pi}{3}$                       D)  $\frac{\pi}{4}$

**Use a sketch to find the exact value of  $y$ .**

49)  $y = \cos^{-1}\left(\tan\left(-\frac{3\pi}{4}\right)\right)$  49) \_\_\_\_\_

- A) 0                      B)  $-\frac{\pi}{2}$                       C)  $\pi$                       D)  $\frac{\pi}{2}$

**Use the fundamental identities and appropriate algebraic operations to simplify the expression.**

50)  $\sin^2 x(\cot^2 x + 1)$  50) \_\_\_\_\_

- A)  $\cos^2 x + 1$                       B) 1                      C)  $\tan^2 x$                       D) -1

**Find the exact value.**

51) Given that  $\cos C = -5/13$  with  $C$  in quadrant II, find  $\cos 2C$ . 51) \_\_\_\_\_

- A)  $\frac{120}{169}$                       B)  $-\frac{119}{169}$                       C)  $-\frac{120}{169}$                       D)  $\frac{119}{169}$

52) Given that  $\sin A = -4/5$  with  $A$  in quadrant IV, find  $\cos 2A$ . 52) \_\_\_\_\_

- A)  $-\frac{7}{25}$                       B)  $\frac{7}{25}$                       C)  $-\frac{24}{25}$                       D)  $\frac{24}{25}$

**Find the exact value by using a half-angle identity.**

53)  $\cos 22.5^\circ$  53) \_\_\_\_\_

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

**Use the given information given to find the exact value of the trigonometric function.**

54)  $\sin \theta = -\frac{3}{5}$ ,  $\theta$  lies in quadrant IV Find  $\sin \frac{\theta}{2}$ . 54) \_\_\_\_\_

- A)  $-\frac{\sqrt{5}}{5}$                       B)  $\frac{\sqrt{5}}{5}$                       C)  $-\frac{\sqrt{30}}{10}$                       D)  $-\frac{\sqrt{10}}{10}$

**Complete the identity.**

55)  $\sin(\alpha + \beta) + \sin(\alpha - \beta) = ?$  55) \_\_\_\_\_

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

**Use the given information to find the exact value of the expression.**

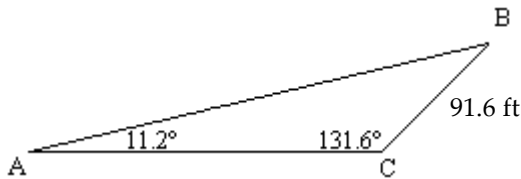
56) Find  $\sin(\alpha + \beta)$ .  $\tan \alpha = \frac{15}{8}$ ,  $\alpha$  lies in quadrant III, and  $\cos \beta = -\frac{7}{25}$ ,  $\beta$  lies in quadrant II. 56) \_\_\_\_\_

- A)  $-\frac{87}{425}$                       B)  $-\frac{304}{425}$                       C)  $\frac{416}{425}$                       D)  $\frac{297}{425}$

- 57) Find  $\cos(\alpha + \beta)$ .  $\sin \alpha = \frac{7}{25}$ ,  $\alpha$  lies in quadrant I, and  $\cos \beta = \frac{20}{29}$ ,  $\beta$  lies in quadrant I. 57) \_\_\_\_\_
- A)  $\frac{333}{725}$                       B)  $\frac{644}{725}$                       C)  $\frac{627}{725}$                       D)  $-\frac{364}{725}$

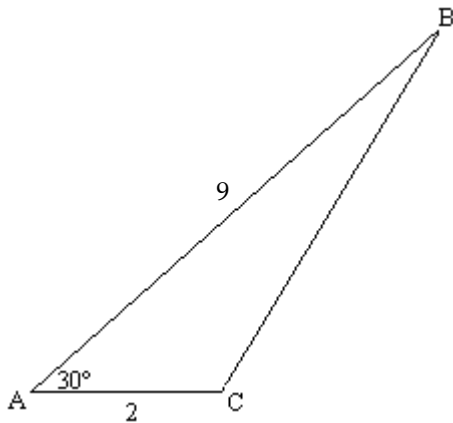
**Solve the triangle. Round the answer to the nearest tenth.**

- 58) \_\_\_\_\_



- A)  $B = 37.2^\circ$ ,  $b = 285.2$  ft,  $c = 352.7$  ft                      B)  $B = 37.2^\circ$ ,  $b = 352.7$  ft,  $c = 285.2$  ft  
 C)  $B = 36.8^\circ$ ,  $b = 282.5$  ft,  $c = 352.7$  ft                      D)  $B = 37.2^\circ$ ,  $b = 29.4$  ft,  $c = 23.9$  ft

- 59) \_\_\_\_\_



- A)  $a \approx 7.3$ ,  $B \approx 7.8^\circ$ ,  $C \approx 142.2^\circ$                       B)  $a \approx 8.3$ ,  $B \approx 6.9^\circ$ ,  $C \approx 143.1^\circ$   
 C)  $a \approx 8.3$ ,  $B \approx 2.8^\circ$ ,  $C \approx 147.2^\circ$                       D)  $a \approx 7.3$ ,  $B \approx 7.8^\circ$ ,  $C \approx 37.8^\circ$

**Solve the problem.**

- 60) To find the distance between two small towns, an electronic distance measuring (EDM) instrument is placed on a hill from which both towns are visible. If the distance from the EDM to the towns is 3.4 miles and 2.2 miles and the angle between the two lines of sight is  $64^\circ$ , what is the distance between the towns? Round your answer to the nearest tenth of a mile. 60) \_\_\_\_\_

- A) 4.4 mi                      B) 3.6 mi                      C) 3.1 mi                      D) 4.8 mi

- 61) Two tracking stations are on the equator 126 miles apart. A weather balloon is located on a bearing of  $N 32^\circ E$  from the western station and on a bearing of  $N 22^\circ E$  from the eastern station. How far is the balloon from the western station? Round to the nearest mile. 61) \_\_\_\_\_

- A) 682 mi                      B) 673 mi                      C) 587 mi                      D) 578 mi

## Answer Key

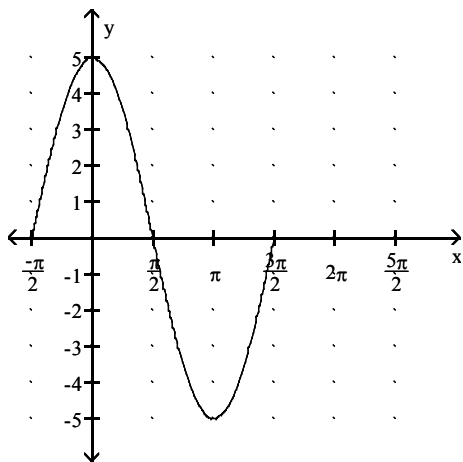
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- 1) A
- 2) D
- 3) A
- 4) A
- 5) B
- 6) B
- 7) C
- 8) D
- 9) A
- 10) A
- 11) D
- 12) C
- 13) D
- 14) C
- 15) C
- 16) B
- 17) B
- 18) B
- 19) C
- 20) D
- 21) C
- 22) A
- 23) C
- 24) C
- 25) C
- 26) D
- 27) B
- 28) A
- 29) C
- 30) D
- 31) B
- 32) C
- 33) A
- 34) \$1043.79
- 35) \$864.12
- 36) A
- 37) C
- 38) C
- 39) A
- 40) D
- 41) A
- 42) A
- 43) B
- 44) C
- 45) D
- 46) B

Answer Key

Testname: REVIEW FOR FINAL EXAM

47)



- 48) D
- 49) A
- 50) B
- 51) B
- 52) A
- 53) C
- 54) D
- 55) C
- 56) A
- 57) A
- 58) A
- 59) A
- 60) C
- 61) B