

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

Determine whether the function is symmetric with respect to the y-axis, symmetric with respect to the x-axis, symmetric with respect to the origin, or none of these.

1)  $y = 3x^2 - 5$

A) Origin only

B) y-axis only

C) x-axis only

D) x-axis, y-axis, origin

2)  $y = -5x^3 + 2x$

A) x-axis, y-axis, origin

B) origin only

C) x-axis only

D) y-axis only

3)  $y^2 - 1 = x$

A) y-axis only

B) origin only

C) x-axis only

D) none of these

4)  $y = \frac{-x^5}{x^2 - 7}$

A) origin only

B) y-axis only

C) x-axis only

D) none of these

Using a graphing utility, determine where the function is increasing and decreasing. Round answers to 3 decimal places.

5)  $f(x) = 4x^3 - 5x^2 - 7x + 3$

A) the graph is increasing on  $(-\infty, -0.453)$  and  $(4.773, \infty)$ ; decreasing on  $(-0.453, 4.773)$ B) the graph is increasing on  $(-5.764, \infty)$ ; decreasing on  $(-\infty, 4.773)$ C) the graph is increasing on  $(-\infty, 4.773)$ ; decreasing on  $(-5.764, \infty)$ D) the graph is increasing on  $(-\infty, -0.453)$  and  $(1.287, \infty)$ ; decreasing on  $(-0.453, 1.287)$ 

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

6)  $f(x) = x^3 - 4x$

A) Even

B) Odd

C) Neither

7)  $f(x) = 2x^2 + x^4$

A) Odd

B) Even

C) Neither

8)  $f(x) = x^3 - x^2$

A) Odd

B) Even

C) Neither

9)  $\frac{x^5}{x^3 + 1}$

A) odd

B) even

C) neither

Solve the problem.

10) Evaluate the expression  $3f(-2) + 4f(2) + 5f(0)$ , given  $f(x) = \begin{cases} 2x - 3 & \text{if } x < 0 \\ x + 1 & \text{if } x \geq 0 \end{cases}$

A) 18

B) 28

C) -16

D) -4

**Find the function.**

- 11) Find the function that is finally graphed after the following transformations are applied to the graph of  $y = |x|$ . The graph is shifted right 3 units, stretched by a factor of 3, shifted vertically down 2 units, and finally reflected across the  $x$ -axis.

A)  $y = -[3|x + 3| - 2]$       B)  $y = -3|x - 3| - 2$       C)  $y = -[3|x - 3| - 2]$       D)  $y = 3|-x - 3| - 2$

**Solve the problem.**

- 12) The graph of which function  $y_2$  below is the reflection of the graph of  $y_1 = \frac{1}{x}$  across the  $x$ -axis?

A)  $y_2 = \frac{x}{1}$       B)  $y_2 = -(1/x)$       C)  $y_2 = \frac{-1}{-x}$       D)  $y_2 = -(x/1)$

**Find the indicated composite for the pair of functions.**

- 13)  $(f \circ g)(x)$ :  $f(x) = 7x + 8$ ,  $g(x) = 5x - 1$

A)  $35x + 7$       B)  $35x + 1$       C)  $35x + 15$       D)  $35x + 39$

**Find the domain of the composite function  $f \circ g$ .**

- 14)  $f(x) = 6x + 54$ ;  $g(x) = x + 1$

A)  $\{x \mid x \neq 10\}$       B)  $\{x \mid x \neq -1, x \neq -9\}$   
C)  $\{x \mid x \text{ is any real number}\}$       D)  $\{x \mid x \neq -10\}$

**The function  $f$  is one-to-one. Find its inverse.**

- 15) Determine the equation for the inverse function of  $y = (x + 2)^3 - 8$ .

A)  $y = \sqrt[3]{x + 10}$       B)  $y = \sqrt[3]{x - 2} + 8$       C)  $y = \sqrt[3]{x + 6}$       D)  $y = \sqrt[3]{x + 8} - 2$

**Find the inverse function of  $f$ . State the domain and range of  $f$ .**

- 16)  $f(x) = \frac{3x - 2}{x + 5}$

A)  $f^{-1}(x) = \frac{x + 5}{3x - 2}$ ; domain of  $f$ :  $\{x \mid x \neq -5\}$ ; range of  $f$ :  $\{y \mid y \neq \frac{2}{3}\}$   
B)  $f^{-1}(x) = \frac{5x + 2}{3 + x}$ ; domain of  $f$ :  $\{x \mid x \neq -5\}$ ; range of  $f$ :  $\{y \mid y \neq -3\}$   
C)  $f^{-1}(x) = \frac{5x + 2}{3 - x}$ ; domain of  $f$ :  $\{x \mid x \neq -5\}$ ; range of  $f$ :  $\{y \mid y \neq 3\}$   
D)  $f^{-1}(x) = \frac{3x + 2}{x - 5}$ ; domain of  $f$ :  $\{x \mid x \neq -5\}$ ; range of  $f$ :  $\{y \mid y \neq 5\}$

**Solve the problem.**

- 17) What is the range of the cosine function?

A) all real numbers greater than or equal to 1 or less than or equal to -1  
B) all real numbers from -1 to 1, inclusive  
C) all real numbers greater than or equal to 0  
D) all real numbers

18) What is the domain of the cosine function?

- A) all real numbers from -1 to 1, inclusive
- B) all real numbers, except integral multiples of  $\pi$  ( $180^\circ$ )
- C) all real numbers, except odd multiples of  $\frac{\pi}{2}$  ( $90^\circ$ )
- D) all real numbers

Use the fact that the trigonometric functions are periodic to find the exact value of the expression.

19)  $\cos \frac{10\pi}{3}$

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

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

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

D)  $\frac{1}{2}$

20)  $\sec \frac{13\pi}{4}$

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

B)  $-\sqrt{2}$

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

D) -2

Find the exact value of the expression.

21) If  $\cos \theta = 0.7$ , find the value of  $\cos \theta + \cos(\theta + 2\pi) + \cos(\theta + 4\pi)$ .

A) 4.1

B) 0.7

C)  $2.1 + 6\pi$

D) 2.1

Find the exact value of the requested trigonometric function of  $\theta$ .

22)  $\cos \theta = \frac{2}{5}$  and  $\tan \theta < 0$

Find  $\sin \theta$ .

A)  $-\sqrt{21}$

B)  $-\frac{\sqrt{21}}{2}$

C)  $-\frac{5}{2}$

D)  $-\frac{\sqrt{21}}{5}$

23)  $\csc \theta = -\frac{7}{4}$  and  $\theta$  in quadrant III

Find  $\cot \theta$ .

A)  $\frac{\sqrt{33}}{4}$

B)  $-\frac{7\sqrt{33}}{33}$

C)  $-\frac{4\sqrt{33}}{33}$

D)  $-\frac{\sqrt{33}}{7}$

Give the amplitude or period as requested.

24) Amplitude of  $y = -3 \sin 5x$

A)  $\frac{\pi}{5}$

B)  $\frac{3}{5}$

C) 3

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

Determine the amplitude and period of the function without graphing.

25)  $y = -\frac{3}{4} \sin\left(\frac{2}{5}x\right)$

A) amplitude =  $\frac{3}{4}$ ; period =  $\frac{4\pi}{5}$

B) amplitude =  $\frac{3}{4}$ ; period =  $5\pi$

C) amplitude =  $\frac{4}{3}$ ; period = 5

D) amplitude =  $-\frac{3}{4}$ ; period =  $5\pi$

Write the equation of a sine function with the given characteristics.

26) Amplitude: 4

Period:  $3\pi$

A)  $y = 4 \sin(3x)$

B)  $y = 4 \sin\left(\frac{2}{3}x\right)$

C)  $y = \sin(3x) + 4$

D)  $y = 3 \sin\left(\frac{1}{2}x\right)$

Find the phase shift of the function.

27)  $y = -2 \sin\left(4x - \frac{\pi}{2}\right)$

A)  $\pi/8$  units to the right

C)  $4\pi$  units down

B)  $2\pi$  units up

D)  $\pi/2$  units to the left

28)  $y = 2 \sin\left(\frac{1}{2}x - \frac{\pi}{2}\right)$

A)  $\pi/2$  units to the right

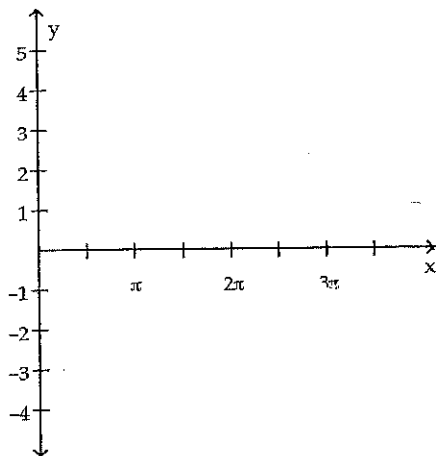
C)  $\pi/2$  units to the left

B)  $\pi/4$  units to the left

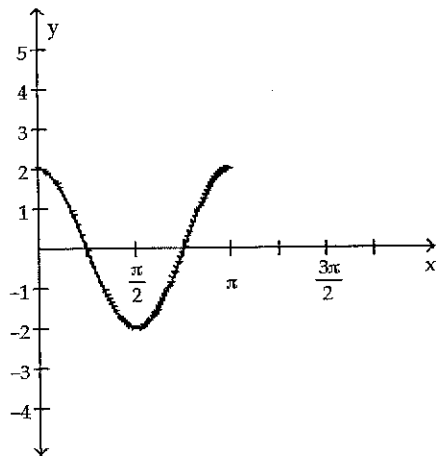
D)  $\pi$  units to the right

Graph the sinusoidal function over one complete period.

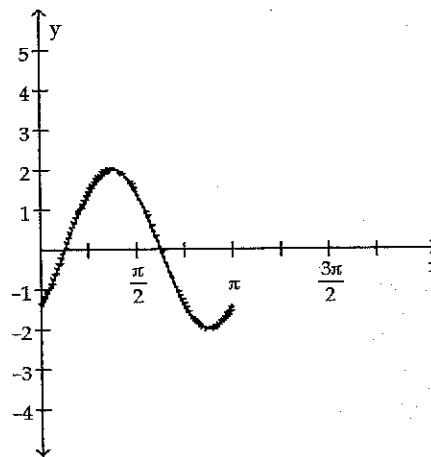
29)  $y = 3 \sin\left(\frac{1}{2}x + \frac{\pi}{4}\right)$



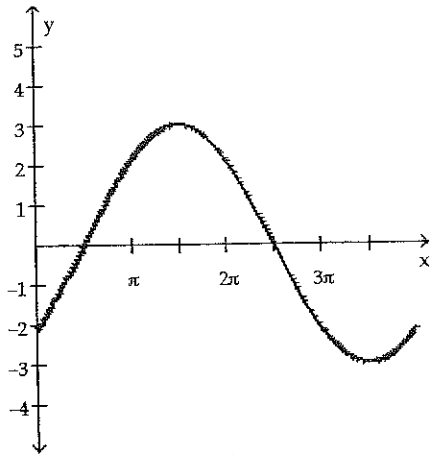
A)



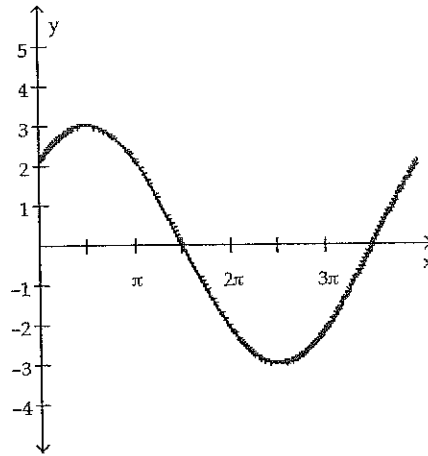
B)



C)



D)



Write the equation of a sine function with the given characteristics.

30) Amplitude: 4

Period:  $\pi$ Phase Shift:  $-2$ 

A)  $y = 4 \sin(2x + 4)$

B)  $y = \sin(4x + 2)$

C)  $y = 4 \sin\left(\frac{1}{2}x - 4\right)$

D)  $y = 4 \sin(x - 2)$

Find the value of the expression.

31)  $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

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

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

C)  $\frac{-3\pi}{4}$

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

Find the exact value of the expression.

32)  $\sin(\tan^{-1} 2)$

A)  $5\sqrt{2}$

B)  $2\sqrt{5}$

C)  $\frac{2\sqrt{5}}{5}$

D)  $\frac{5\sqrt{2}}{2}$

33)  $\cos^{-1}\left(\sin \frac{7\pi}{6}\right)$

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

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

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

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

Complete the identity.

34)  $\sec \theta - \frac{1}{\sec \theta} = ?$

A)  $1 + \cot \theta$

B)  $\sec \theta \csc \theta$

C)  $-2 \tan^2 \theta$

D)  $\sin \theta \tan \theta$

35)  $\frac{\sec \theta \sin \theta}{\tan \theta} - 1 = ?$

A) 0

B)  $1 - \sin \theta$

C) 1

D)  $-\sec^2 \theta$

Find the exact value by using a sum or difference identity.

36)  $\sin 165^\circ$

A)  $\frac{\sqrt{2}(\sqrt{3}-1)}{4}$

B)  $-\sqrt{2}(\sqrt{3}-1)$

C)  $-\frac{\sqrt{2}(\sqrt{3}-1)}{4}$

D)  $-\sqrt{2}(\sqrt{3}+1)$

Find the exact value of the expression under the given conditions.

37)  $\sin \theta = \frac{20}{29}$ ,  $0 < \theta < \frac{\pi}{2}$

Find  $\cos(2\theta)$ .

A)  $\frac{41}{841}$

B)  $\frac{42}{841}$

C)  $-\frac{41}{841}$

D)  $\frac{840}{841}$

38)  $\sec \theta = -\frac{5\sqrt{21}}{21}$ ,  $\csc \theta > 0$

Find  $\sin(2\theta)$ .

A)  $\frac{-4\sqrt{21}}{25}$

B)  $\frac{4\sqrt{21}}{25}$

C)  $\frac{17}{25}$

D)  $-\frac{17}{25}$

Solve the equation for the interval  $[0, 2\pi)$ .

39)  $\cos^2 x + 2 \cos x + 1 = 0$

$(\cos x + 1)(\cos x + 1) = 0$

A)  $x = \frac{\pi}{2}, \frac{3\pi}{2}$

B)  $x = \pi$

C)  $x = 2\pi$

D)  $x = \frac{\pi}{4}, \frac{7\pi}{4}$

40)  $2 \sin^2 x = \sin x$

A)  $x = \frac{\pi}{6}, \frac{5\pi}{6}$

B)  $x = \frac{\pi}{3}, \frac{2\pi}{3}$

C)  $x = 0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$

D)  $x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}$

Solve the equation on the interval  $0 \leq \theta < 2\pi$ . Round answer to two decimal places.

41)  $6 \cos^2 \theta - 7 \cos \theta - 3 = 0$

A)  $\theta = 0.84, 5.44$

B)  $\theta = -\frac{1}{3}, \frac{3}{2}$

C)  $\theta = 1.91, 4.37$

D)  $\theta = 1.23, 4.37$

Solve the problem.

42) Given a triangle with  $a = 11$ ,  $\gamma = 35^\circ$ , and  $\beta = 16^\circ$ , what is the length of  $c$ ? Round the answer to two decimal places.

A)  $c = 8.12$

B)  $c = 31.01$

C)  $c = 5.29$

D)  $c = 22.89$

Solve the triangle. Assume that sides  $a$ ,  $b$ , and  $c$  are opposite angles  $\alpha$ ,  $\beta$ , and  $\gamma$  respectively. Round answers to two decimal places, if necessary.

43)  $\alpha = 28^\circ$

$\beta = 52^\circ$

$c = 8$

A)  $\gamma = 110^\circ$ ,  $a = 4.00$ ,  $b = 6.92$

B)  $\gamma = 100^\circ$ ,  $a = 3.81$ ,  $b = 7.03$

C)  $\gamma = 100^\circ$ ,  $a = 3.81$ ,  $b = 6.40$

D)  $\gamma = 110^\circ$ ,  $a = 4.00$ ,  $b = 6.71$

Solve the problem.

44) Given a triangle with  $a = 9$ ,  $b = 11$ ,  $\alpha = 31^\circ$ , what is (are) the possible length(s) of  $c$ ? Round your answer to two decimal places.

A)  $c = 6.61$

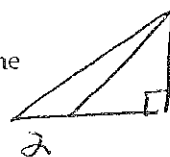
B)  $c = 16.42$  or  $2.44$

C)  $c = 16.42$  or  $3.41$

D)  $c = 14.21$

45) An airplane is sighted at the same time by two ground observers who are 2 miles apart and in line with the airplane. They report the angles of elevation as  $10^\circ$  and  $22^\circ$ . How high is the airplane?

- A) 1.35 miles                      B) 0.63 miles                      C) 0.75 miles                      D) 0.35 miles



46) Two points A and B are on opposite sides of a building. A surveyor selects a third point C to place a transit. Point C is 46 feet from point A and 65 feet from point B. The angle ACB is  $53^\circ$ . How far apart are points A and B?

- A) 99.7 feet                      B) 67.4 feet                      C) 52.4 feet                      D) 90.2 feet

Find the area of the triangle with the given parts.

47) Find the area of the triangle with  $\alpha = 83^\circ$ ,  $b = 9$  feet, and  $c = 6$  feet. Round your answer to two decimal places.

- A) 27.00 ft<sup>2</sup>                      B) 53.60 ft<sup>2</sup>                      C) 26.80 ft<sup>2</sup>                      D) 3.29 ft<sup>2</sup>

48) Find the area of a triangle with sides 4 m, 5 m, and 7 m. Round to the nearest hundredth.

- A) 10.00 m<sup>2</sup>                      B) 9.80 m<sup>2</sup>                      C) 3.46 m<sup>2</sup>                      D) 16.00 m<sup>2</sup>

Find the area of the triangle. Assume that sides  $a$ ,  $b$ , and  $c$  are opposite angles  $\alpha$ ,  $\beta$ , and  $\gamma$  respectively. Round answer to two decimal places, if necessary.

49)  $a = 14$ ,  $b = 32$ ,  $c = 26$

- A) 5280                      B) 3219.69                      C) 182                      D) 177.99

An object attached to a coiled spring is pulled down a distance  $a$  from its rest position and then released. Assume that the motion is simple harmonic with period  $T$ . Write an equation that relates the distance  $d$  of the object from its rest position after  $t$  seconds.

50)  $a = 8$ ;  $T = 5$  seconds

- A)  $d = -8 \cos \left[ \frac{2}{5} \pi t \right]$                       B)  $d = -8 \cos \left[ \frac{\pi}{5} t \right]$                       C)  $d = -8 \sin \left[ \frac{2}{5} \pi t \right]$                       D)  $d = -5 \cos \left[ \frac{1}{4} \pi t \right]$

Solve the problem.

51) An object attached to a coiled spring is pulled down a distance of 5 cm from its rest position and then released. Assuming that the motion is simple harmonic with period 10 seconds, write an equation that relates the displacement  $d$  of the object from its rest position after  $t$  seconds. Assume that the positive direction of the motion is up.

- A)  $d = 5 \cos (10t)$                       B)  $d = -5 \cos (10t)$                       C)  $d = -5 \cos \left( \frac{\pi}{5} t \right)$                       D)  $d = 5 \cos \left( \frac{\pi}{5} t \right)$

The distance that an object travels in  $t$  seconds is given. What is the maximum displacement from its resting position, the time required for one oscillation, and the frequency?

52)  $d = 5 \sin (3t)$  meters

- A)  $a = -5$  meters, period =  $\frac{2}{3} \pi$  seconds,  $f = \frac{3}{2\pi}$  oscillations/second  
 B)  $a = 5$  meters, period =  $3 \pi$  seconds,  $f = \frac{3}{\pi}$  oscillations/second  
 C)  $a = 5$  meters, period =  $\frac{3}{2\pi}$  seconds,  $f = \frac{2}{3} \pi$  oscillations/second  
 D)  $a = 5$  meters, period =  $\frac{2}{3} \pi$  seconds,  $f = \frac{3}{2\pi}$  oscillations/second

53)  $d = -3 \sin(5t)$  meters

A)  $a = 3$  meters, period  $= \frac{5}{2\pi}$  seconds,  $f = \frac{2}{5}\pi$  oscillations/second

B)  $a = -3$  meters, period  $= \frac{2}{5}\pi$  seconds,  $f = \frac{5}{2\pi}$  oscillations/second

C)  $a = -3$  meters, period  $= 5\pi$  seconds,  $f = \frac{5}{\pi}$  oscillations/second

D)  $a = 3$  meters, period  $= \frac{2}{5}\pi$  seconds,  $f = \frac{5}{2\pi}$  oscillations/second



Answer Key

Testname: UNTITLED1.TST

- 1) Answer: B
- 2) Answer: B
- 3) Answer: C
- 4) Answer: A
- 5) Answer: D
- 6) Answer: B
- 7) Answer: B
- 8) Answer: C
- 9) Answer: C
- 10) Answer: D
- 11) Answer: C
- 12) Answer: B
- 13) Answer: B
- 14) Answer: C
- 15) Answer: D
- 16) Answer: C
- 17) Answer: B
- 18) Answer: D
- 19) Answer: C
- 20) Answer: B
- 21) Answer: D
- 22) Answer: D
- 23) Answer: A
- 24) Answer: C
- 25) Answer: B
- 26) Answer: B
- 27) Answer: A
- 28) Answer: D
- 29) Answer: D
- 30) Answer: A
- 31) Answer: B
- 32) Answer: C
- 33) Answer: C
- 34) Answer: D
- 35) Answer: A
- 36) Answer: A
- 37) Answer: A
- 38) Answer: A
- 39) Answer: B
- 40) Answer: C

Answer Key

Testname: UNTITLED1.TST

- 41) Answer: C
- 42) Answer: A
- 43) Answer: C
- 44) Answer: B
- 45) Answer: B
- 46) Answer: C
- 47) Answer: C
- 48) Answer: B
- 49) Answer: D
- 50) Answer: A
- 51) Answer: C
- 52) Answer: D
- 53) Answer: D