

Name \_\_\_\_\_

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

**Solve the problem.**

1) What is the range of the cosine function? 1) \_\_\_\_\_

2) An experiment in a wind tunnel generates cyclic waves. The following data is collected for 52 seconds: 2) \_\_\_\_\_

| Time<br>(in seconds) | Wind speed<br>(in feet per second) |
|----------------------|------------------------------------|
| 0                    | 16                                 |
| 13                   | 41                                 |
| 26                   | 66                                 |
| 39                   | 41                                 |
| 52                   | 16                                 |

Let  $V$  represent the wind speed (velocity) in feet per second and let  $t$  represent the time in seconds. Write a sine equation that describes the wave.

**The point  $P(x, y)$  on the unit circle that corresponds to a real number  $t$  is given. Find the value of the indicated trigonometric function at  $t$ .**

3)  $\left(-\frac{\sqrt{33}}{7}, \frac{4}{7}\right)$  Find  $\cos t$ . 3) \_\_\_\_\_

**Use even and odd properties of the trigonometric functions to find the exact value of the expression.**

4)  $\sin\left(-\frac{\pi}{3}\right)$  4) \_\_\_\_\_

**Determine the phase shift of the function.**

5)  $y = \frac{1}{4} \sin(4x + \pi)$  5) \_\_\_\_\_

**Find the exact value of the trigonometric function. Do not use a calculator.**

6)  $\csc \frac{3\pi}{4}$  6) \_\_\_\_\_

**Find the exact value of the expression, if possible. Do not use a calculator.**

7)  $\sin^{-1}\left[\sin\left(\frac{5\pi}{7}\right)\right]$  7) \_\_\_\_\_

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

8)  $\tan^2 x \sin x = \tan^2 x$  8) \_\_\_\_\_

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

9)  $\tan 2x - \tan x = 0$

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

10)  $\sec \frac{x}{2} = \cos \frac{x}{2}$

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

11)  $2 \sin^2 x = \sin x$

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

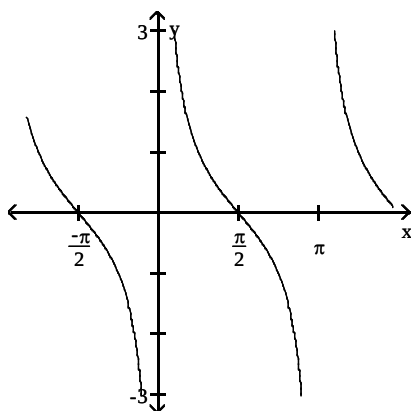
**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

Match the function to its graph.

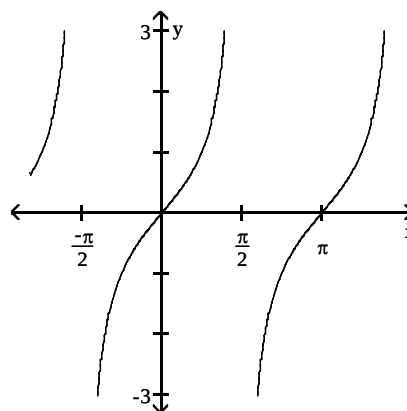
12)  $y = -\tan x$

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

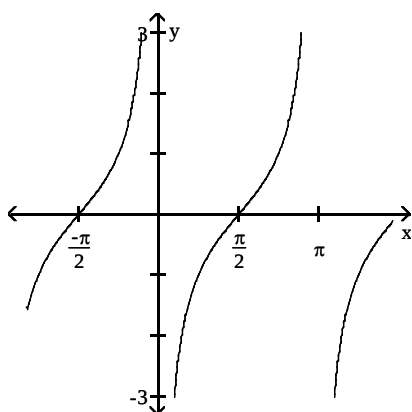
A)



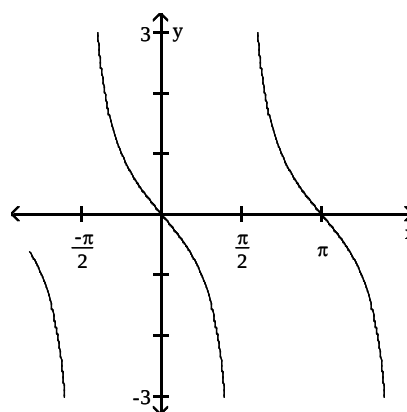
B)



C)



D)



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

Sin  $t$  and cos  $t$  are given. Use identities to find the indicated value. Where necessary, rationalize denominators.

13)  $\sin t = -\frac{5}{7}$ ,  $\cos t = \frac{2\sqrt{6}}{7}$ . Find  $\tan t$ .

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

Determine the amplitude or period as requested.

14) Amplitude of  $y = -5 \sin \frac{1}{4}x$

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

Use a sketch to find the exact value of the expression.

15)  $\cot\left(\sin^{-1}\frac{\sqrt{2}}{2}\right)$  15) \_\_\_\_\_

Verify the identity.

16)  $\sin 4t = 2 \sin 2t \cos 2t$  16) \_\_\_\_\_

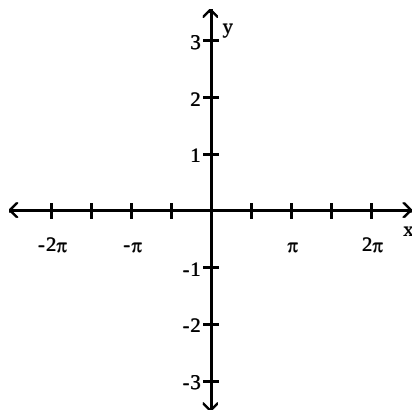
Use the given information to find the exact value of the expression.

17)  $\tan \theta = \frac{4}{3}$ ,  $\theta$  lies in quadrant III Find  $\sin 2\theta$ . 17) \_\_\_\_\_

18)  $\cos \alpha = -\frac{4}{5}$ ,  $\alpha$  lies in quadrant III, and  $\sin \beta = \frac{\sqrt{21}}{5}$ ,  $\beta$  lies in quadrant II Find  $\cos (\alpha + \beta)$ . 18) \_\_\_\_\_

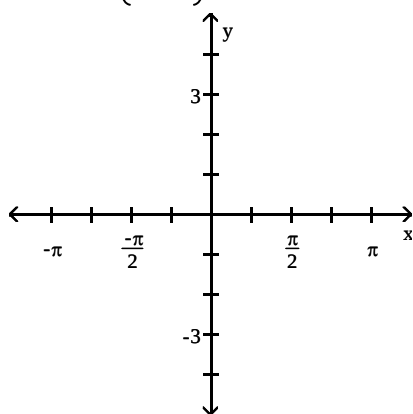
Use a vertical shift to graph the function.

19)  $y = 2 + \sin x$  19) \_\_\_\_\_



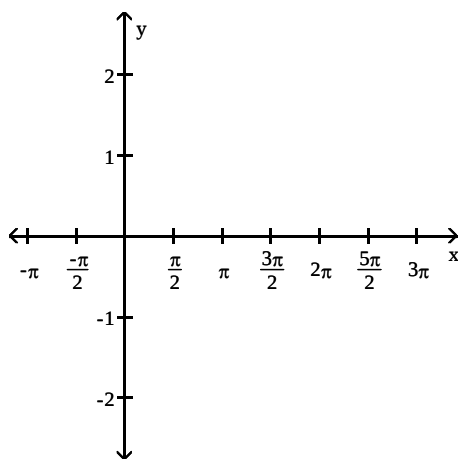
Graph the function.

20)  $y = \frac{3}{4} \sin\left(x - \frac{\pi}{4}\right)$  20) \_\_\_\_\_



21)  $y = \cot x$

21) \_\_\_\_\_



Find the exact value of the expression.

22)  $\sin^{-1}(0.5)$

22) \_\_\_\_\_

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

23) \_\_\_\_\_

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

24)  $\cos(\tan^{-1} x)$

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

Complete the identity.

25)  $\sin(\alpha + \beta) \sin(\alpha - \beta) = ?$

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

Find all solutions of the equation.

26)  $\tan x \sec x = -2 \tan x$

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

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

27)  $\cos 2x = \frac{\sqrt{2}}{2}$

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

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

28)  $\cos x + 2 \cos x \sin x = 0$

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

Solve the problem.

29) The output voltage for an AC generator is approximated by  $v = 156 \cos(120\pi t - \frac{\pi}{3})$ . Find the smallest positive value of  $t$  for which the output is 109 volts.

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

Find the exact value of the expression, if possible. Do not use a calculator.

30)  $\cos^{-1}(\cos \pi)$

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

Use a sketch to find the exact value of the expression.

$$31) \cot\left(\sin^{-1} \frac{5\sqrt{61}}{61}\right)$$

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

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

$$32) \sin(\tan^{-1} \frac{x}{\sqrt{5}})$$

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

Find the exact value of the expression.

$$33) \tan^{-1} \frac{\sqrt{3}}{3}$$

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

# Answer Key

## Testname: UNIT II PRE CALCULUS

1) all real numbers from -1 to 1, inclusive

2)  $V = 25 \sin \left( \frac{\pi}{26} t - \frac{\pi}{2} \right) + 41$

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

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

5)  $\frac{\pi}{4}$  units to the left

6)  $\sqrt{2}$

7)  $\frac{2\pi}{7}$

8)  $0, \pi$

9)  $0, \pi$

10) 0

11)  $0, \pi, \frac{\pi}{6}, \frac{5\pi}{6}$

12) D

13)  $\frac{-5\sqrt{6}}{12}$

14) 5

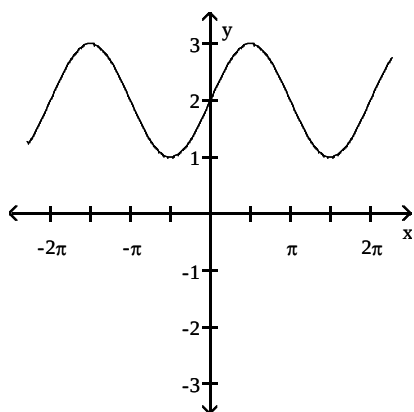
15) 1

16)  $\sin 4t = \sin [2(2t)] = 2 \sin 2t \cos 2t.$

17)  $\frac{24}{25}$

18)  $\frac{8 + 3\sqrt{21}}{25}$

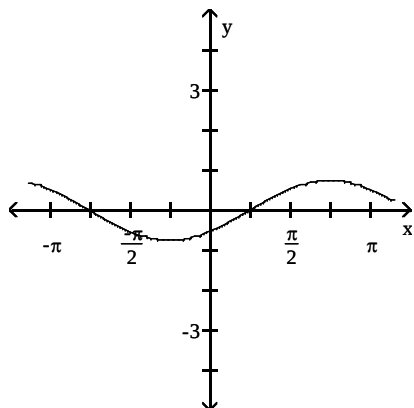
19)



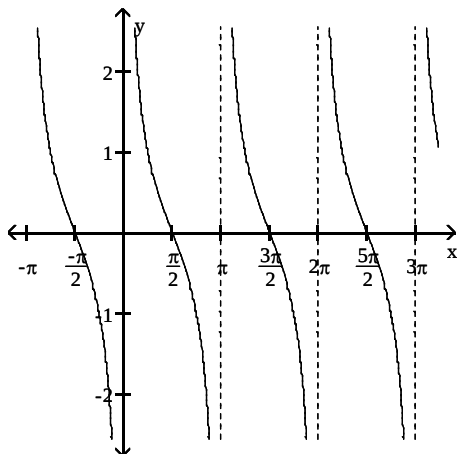
# Answer Key

## Testname: UNIT II PRE CALCULUS

20)



21)



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

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

24)  $\frac{\sqrt{x^2 + 1}}{x^2 + 1}$

25)  $\cos^2 \beta - \cos^2 \alpha$

26)  $x = \frac{2\pi}{3} + 2n\pi$  or  $x = \frac{4\pi}{3} + 2n\pi$  or  $x = n\pi$

27)  $\frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}$

28)  $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$

29) 0.0049 second

30)  $\pi$

31)  $\frac{6}{5}$

32)  $\frac{x\sqrt{x^2 + 5}}{x^2 + 5}$

Answer Key

Testname: UNIT II PRE CALCULUS

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