

Pre - Calculus  
Mathematics 40S

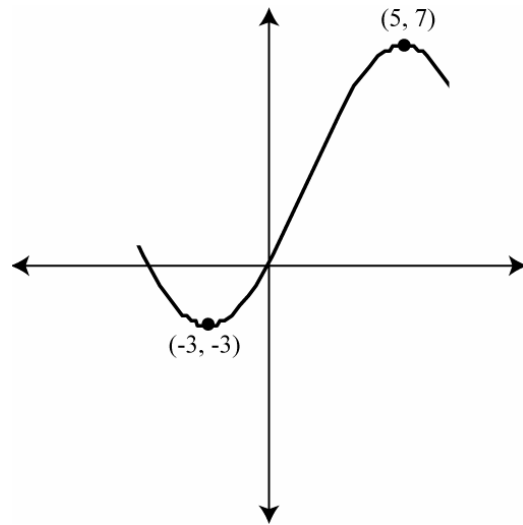


STANDARDS TEST PRACTICE EXAM

***TRIGONOMETRY I***

1. The minimum and the maximum of a trigonometric function are shown in the diagram.

a) Write a cosine equation for the function



b) Determine the value of the  $y$  – intercept, correct to three decimal places

2. Convert  $\frac{11\pi}{18}$  to degrees

3. Find the exact value of  $\sin\theta$  if  $\cos\theta = \frac{1}{\sqrt{7}}$ , and the terminal arm is in Quadrant I.

4. What is the period in the function  $f(x) = 3\sin(5x) - 2$

5. Given the point  $(-3, -4)$ , determine the exact values of  $\cos\theta$  and  $\sin\theta$

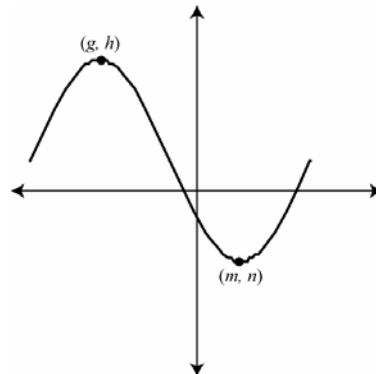
6. The length of arc swept out by an angle  $\theta$  is 50 cm. If the radius of the circle is 18 cm, determine the measure of  $\theta$  in radians.

7. Determine a value for  $x$  that would make the function  $f(x) = 3 \csc x$  undefined in the domain  $[0, 2\pi)$

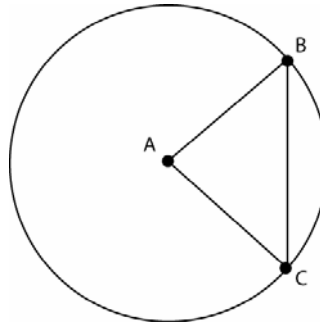
8. Determine the value of  $f(10)$  in the function  $f(x) = 4 \sin[\pi(x-2)] + 3$

9. The graph of  $y = 6 \cos\left(x + \frac{3\pi}{4}\right) + 1$  is illustrated below.

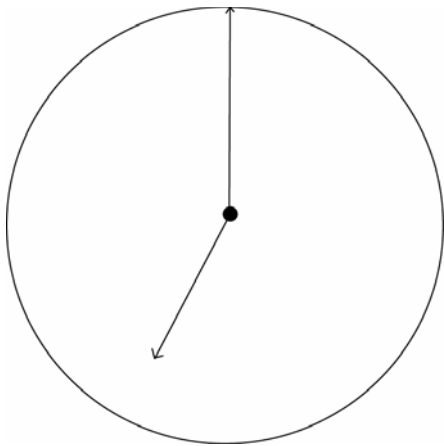
Determine the exact values of  $g$ ,  $h$ ,  $m$  &  $n$ .



10. If the measure of the central angle is  $\frac{\pi}{4}$ , determine the measures of the other two angles within the triangle.

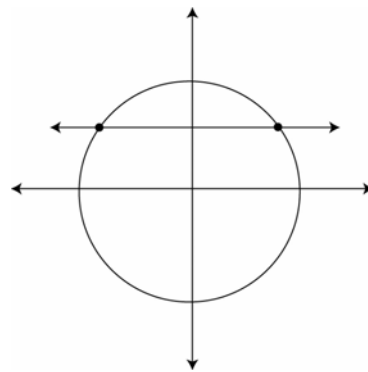


11. Determine the number of radians between the hour hand and the minute hand at 7:00.



12. Determine the value of  $\cos\left(-\frac{7\pi}{4}\right)$

13. The circle  $x^2 + y^2 = 1$  is drawn below, along with the line  $y = \frac{\sqrt{3}}{2}$ .  
Determine the coordinates of the two intersection points.



14. The graph of  $f(x) = 6 \sin x + d$  touches the  $x$ -axis once (*but does not pass through*) on the interval  $0 \leq x \leq 2\pi$ . A possible value for  $d$  is:

**15. a)** Graph  $y = \cos x$

**b)** Graph  $y = \cos^{-1} x$

**c)** State the domain of  $f^{-1}(x)$

**16.** The maximum point on a trigonometric graph is at the point  $(-4, 6)$ , and the minimum point is at  $(2, -2)$ . If the graph is of the form  $y = a \cos[b(x+c)] + d$ , then determine possible values for each of the parameters.

17. An angle of  $15^\circ$  is equivalent to \_\_\_\_\_ radians. (*exact value*)

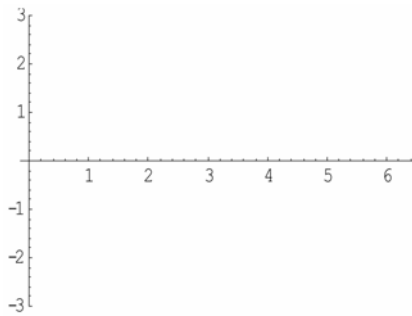
18. The exact value of  $\cos^{-1}\left(\cos\frac{5\pi}{6}\right)$  is

19. Write the general equation of a vertical asymptote in the graph of  $y = \csc x$

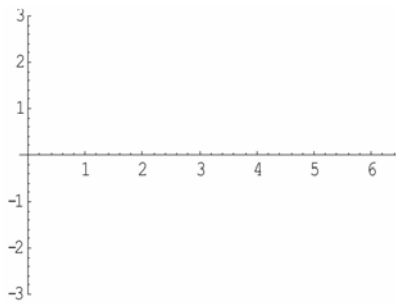
20. If  $\csc \theta = 2$  and  $\tan \theta < 0$ , determine the value of  $\cos \theta$

21. Given the function  $f(x) = 2 \sin \left[ \frac{\pi}{2}(x-2) \right]$

a) Sketch the graph



b) Sketch  $y = |f(x)|$



22. If the coordinates of a point  $P(\theta)$  on the unit circle is  $(a, b)$ , then the coordinates of the point  $P[\theta + 180^\circ]$  are

**23.** State the period of the graph of  $y = \csc \theta$

**24.** Convert  $\frac{3\pi}{5}$  to degrees. Express answer to one decimal place.

**25.** Given the function  $f(x) = \tan x$

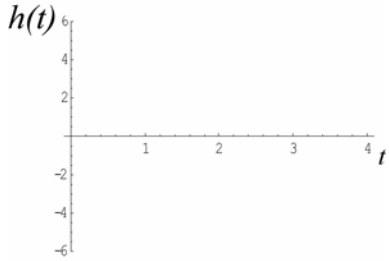
**a)** Sketch  $y = f(x)$  on the domain  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

**b)** State the domain of  $f(x)$

**c)** Sketch the graph of  $f^{-1}(x)$

**26.** A floating ball in a lake goes up and down with the tide.  
At 1 second, the ball has a minimum height of 5 cm below surface level.  
At 3 seconds, the ball has a maximum height of 5 cm above surface level.

**a)** Sketch a graph for the first 4 seconds of motion



**b)** Write an equation for the function

**27.** If the product of  $\cos x$  and  $\sin x$  is negative, then which quadrant is the angle in?

**28.** The value of  $\sin^{-1}\left(\frac{1}{2}\right)$  is

**29.** The exact value of  $\sin\left(\cos\frac{\pi}{2}\right)$  is

**30.** If the coordinates of a point  $P(\theta)$  on the unit circle are  $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$ , then the coordinates of the point  $P[\theta + 180^\circ]$  are

**31.** A tire rolls  $3\pi$  metres while turning  $240^\circ$ . Determine the area of the wheel.

## MULTIPLE CHOICE SECTION

1. Given  $\csc \theta = \frac{5}{4}$ , the exact value of  $\tan \theta$  is

- a)  $\frac{5}{4}$
- b)  $\frac{3}{5}$
- c)  $\pm \frac{3}{4}$
- d)  $\pm \frac{4}{3}$

2. A tire has a radius of  $\frac{\pi}{5}$  m. The tire is rolled and travels a total distance of  $28\pi$  m.

By the time the tire stops, it has rolled through an angle of

- a)  $28\pi$
- b)  $140^\circ$
- c)  $\frac{28}{5}$  rad
- d)  $8021.41^\circ$

3. Given the trigonometric function  $f(x) = \cos x$ , the statement which is true is

- a)  $f(x) = -f(x)$
- b)  $f(x) = f(-x)$
- c)  $f(x) = f^{-1}(x)$
- d)  $f(x) = -f(-x)$

4. If  $90^\circ < \theta < 180^\circ$ , a true statement is

- a)  $0^\circ < \theta < 90^\circ$
- b)  $\cos \theta \leq \tan \theta$
- c)  $0 < \sin \theta < 1$
- d)  $0 < \cos \theta < 1$

5. Given the function  $f(x) = 12 \cos(2x)$ , and the transformation  $g(x) = \frac{1}{4} f(x)$ ,

then the amplitude of  $g(x)$  is

- a) 2
- b) 3
- c) 4
- d) 12

6. The function  $f(x) = 2 \sec x$  has a range of

- a)  $(-2, 2)$
- b)  $(-\infty, -2] \cup [2, \infty)$
- c)  $\left[-\frac{1}{2}, \frac{1}{2}\right]$
- d)  $(-\infty, \infty)$

7. A wheel turns through an angle of 16 radians. This angle measurement in degrees is

- a)  $\frac{\pi^0}{8}$
- b)  $\frac{18^0}{\pi}$
- c)  $8\pi^0$
- d)  $\frac{2800^0}{\pi}$

8. A sine function has a range of  $[-6, 2]$  and a period of 4. A trigonometric equation with these properties is

- a)  $y = 8 \sin\left(\frac{\pi}{2}\theta\right) + 2$
- b)  $y = 4 \sin(4\theta) - 2$
- c)  $y = 4 \sin\left(\frac{\pi}{2}\theta\right) - 2$
- d)  $y = 4 \sin\left(\frac{2}{\pi}\theta\right) - 2$

9. The angle  $\frac{24\pi}{3}$  is co-terminal to an angle of

- a)  $0^\circ$
- b)  $\frac{2\pi}{3}$
- c)  $\frac{5\pi}{6}$
- d)  $\frac{7\pi}{3}$

10. The exact value of  $\csc\left(\frac{7\pi}{4}\right)$  is

- a)  $-\sqrt{2}$
- b)  $-\frac{\sqrt{2}}{2}$
- c)  $\frac{\sqrt{2}}{2}$
- d)  $\sqrt{2}$

11. Given that  $\cos \theta = \frac{4}{5}$  and  $\sin \theta = -\frac{3}{5}$ , then the terminal arm is located in quadrant

- a) I
- b) II
- c) III
- d) IV

12. The period of the function  $g(x)$  is 8. If  $g(0) = 12$ ,  $g(4) = 6$ , and  $g(8) = 12$ , then the value of  $g(12)$  is

- a) 0
- b) 6
- c) 12
- d) 18

13. An angle of  $\frac{3\pi}{2}$  on the unit circle has coordinates of

- a)  $\frac{1}{2}, \frac{\sqrt{3}}{2}$
- b)  $-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}$
- c) (0, -1)
- d) (-1, 0)

14. If  $\sec \theta > 0$  and  $\sin \theta < 0$ , then  $\theta$  terminates in quadrant

- a) I
- b) II
- c) III
- d) IV

15. The period and phase shift for the trigonometric equation  $y = \frac{1}{2} \sin 4\left(\theta - \frac{\pi}{3}\right)$  are

- a) period = 4 ; phase shift =  $\frac{\pi}{3}$  left
- b) period = 4 ; phase shift =  $\frac{\pi}{3}$  right
- c) period =  $\frac{\pi}{2}$  ; phase shift =  $\frac{\pi}{3}$  left
- d) period =  $\frac{\pi}{2}$  ; phase shift =  $\frac{\pi}{3}$  right

16. The equation of an asymptote on the graph of  $y = \csc x$  is

- a)  $x = \frac{\pi}{4}$
- b)  $x = \frac{\pi}{2}$
- c)  $x = \pi$
- d)  $x = \frac{3\pi}{2}$

17. If  $\tan x \sin x < 0$ , then  $x$  terminates in quadrants

- a) II or III
- b) II or IV
- c) I or IV
- d) III or IV

18. The value of  $\sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$  is:

- a)  $\frac{\pi}{4}$
- b)  $\frac{5\pi}{4}$
- c)  $\frac{4\pi}{3}$
- d)  $\frac{11\pi}{6}$