*AAT (IC/HW)-Days 1 & 2 Name Key

Chapter 6: 6-3 Trigonometric Functions of Real Numbers Date: _____ Period: _____

A point P (x,y) is given and corresponds to a real number t. Find the values of the trigonometric functions at t.

1. $P(-\frac{15}{17}, \frac{8}{17})$

$\sin t = y = \frac{8}{17}$; $\csc t = \frac{17}{8}$

$\cos t = x = \frac{-15}{17}$; $\sec t = \frac{-17}{15}$

$\tan t = \frac{y}{x} = \frac{-8}{15}$; $\cot t = \frac{-15}{8}$

2. $P(\frac{24}{25}, -\frac{7}{25})$

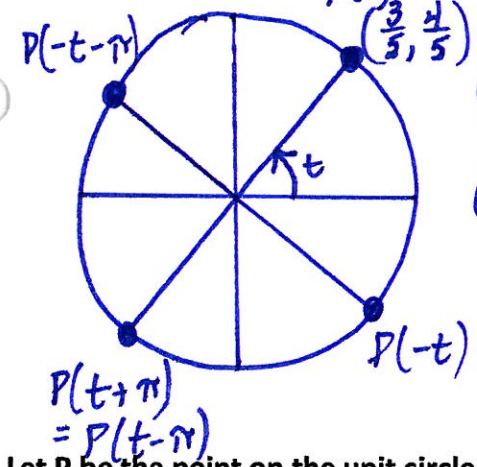
$\sin t = y = \frac{-7}{25}$; $\csc t = \frac{-25}{7}$

$\cos t = x = \frac{24}{25}$; $\sec t = \frac{25}{24}$

$\tan t = \frac{y}{x} = \frac{-7}{24}$; $\cot t = \frac{-24}{7}$

Let P(t) be the point on the unit circle U that corresponds to t. If P(t) has the given rectangular coordinates, find (a) P(t + π) (b) P(t - π) (c) P(-t) (d) P(-t - π)

3. $(\frac{3}{5}, \frac{4}{5})$



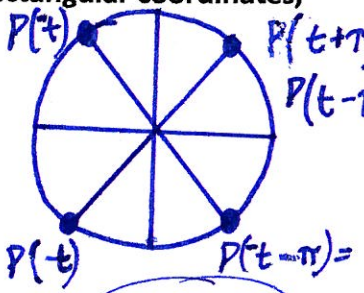
(a) $P(t+\pi) = (-\frac{3}{5}, -\frac{4}{5})$

(b) $P(t-\pi) = (-\frac{3}{5}, -\frac{4}{5})$

(c) $P(-t) = (\frac{3}{5}, -\frac{4}{5})$

(d) $P(-t-\pi) = (-\frac{3}{5}, \frac{4}{5})$

4. $(-\frac{12}{13}, -\frac{5}{13})$



(a) $P(t+\pi) = (\frac{12}{13}, \frac{5}{13})$

(b) $P(t-\pi) = (\frac{12}{13}, \frac{5}{13})$

(c) $P(-t) = (-\frac{12}{13}, \frac{5}{13})$

(d) $P(-t-\pi) = (\frac{12}{13}, -\frac{5}{13})$

Let P be the point on the unit circle U that corresponds to t. Find the coordinates of P and the exact values of the trigonometric functions of t, whenever possible.

5. (a) 2π (b) -3π

$t = 2\pi = P(x,y) = (1,0)$

0, 1, 0, u, 1, u

$t = -3\pi = P(x,y) = (-1,0)$

0, -1, 0, u, -1, u

6. (a) 3π/2 (b) -7π/2

$t = \frac{3\pi}{2} = P(x,y) = (0,-1)$

-1, 0, u, -1, u, 0

$t = \frac{-7\pi}{2} = P(x,y) = (0,1)$

1, 0, u, 1, u, 0

7. (a) 9π/4 (b) -5π/4

$t = \frac{9\pi}{4} = P(x,y) = (\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

$\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 1, \sqrt{2}, \sqrt{2}, 1$

$t = \frac{-5\pi}{4} = P(x,y) = (-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$

$\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, -1, \sqrt{2}, -\sqrt{2}, -1$

8. (a) 5π/4 (b) -π/4

$t = \frac{5\pi}{4} = P(x,y) = (-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

$(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}, 1, -\sqrt{2}, -\sqrt{2}, 1)$

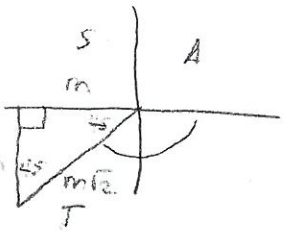
$t = \frac{-\pi}{4} = P(x,y) = (\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

$(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, -1, -\sqrt{2}, \sqrt{2}, -1)$

$\cos(-135°) = \cos 135°$

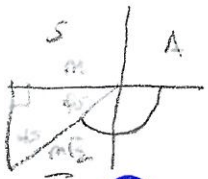
Use a formula for negatives to find the exact value.

9. (a) $\sin(-90°)$ -1

(b) $\cos\left(-\frac{3\pi}{4}\right)$ 

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

(c) $\tan(-45°)$ -1

10. (a) $\cot\left(-\frac{3\pi}{4}\right)$ 

$-\cot\frac{3\pi}{4} = -(-1) = 1$

(b) $\sec(-180°)$ $\sec 180° = -1$

(c) $\csc\left(-\frac{3\pi}{2}\right)$ $-\csc\frac{3\pi}{2} = -(-1) = 1$

Verify the identity by transforming the left-hand side into the right-hand side.

11. $\sin(-x)\sec(-x) = -\tan x$

$(-\sin x)(\sec x) =$

$(-\sin x)\left(\frac{1}{\cos x}\right) =$

$\frac{-\sin x}{\cos x} =$

$-\tan x = -\tan x$

12. $\csc(-x)\cos(-x) = -\cot x$

$(-\csc x)(\cos x) =$

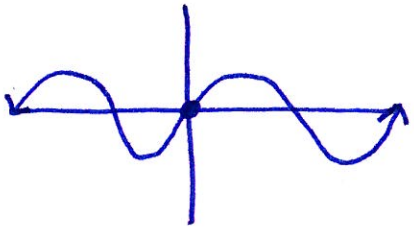
$\left(\frac{-1}{\sin x}\right)(\cos x) =$

$\frac{-\cos x}{\sin x} =$

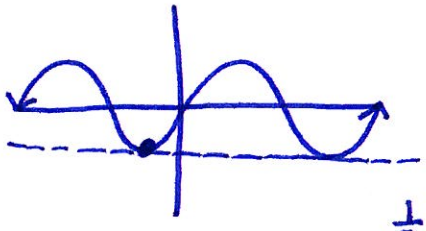
$-\cot x = -\cot x$

Complete the statement by referring to a graph of a trigonometric function.

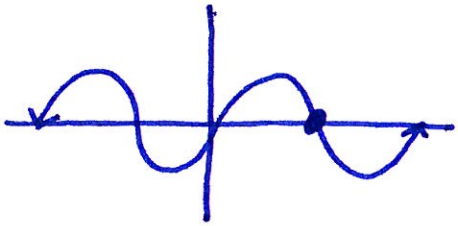
13. (a) As $x \to 0^+$, $\sin x \to$ 0



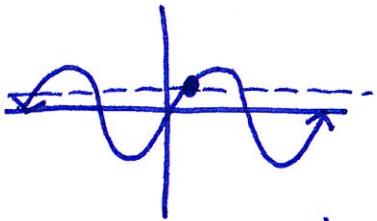
(b) As $x \to (-\pi/2)^-$, $\sin x \to$ -1



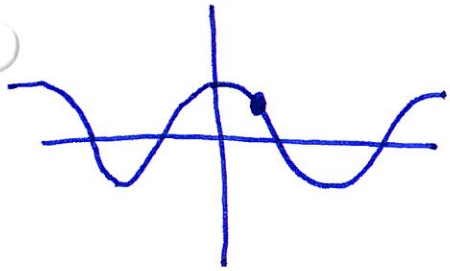
14. (a) As $x \to \pi^+$, $\sin x \to$ 0



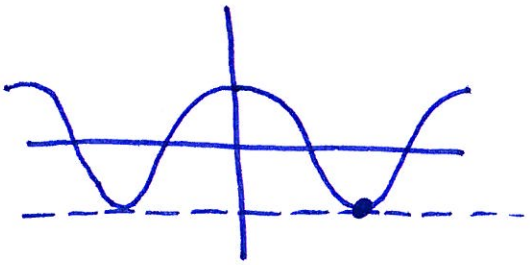
(b) As $x \to (\pi/6)^-$, $\sin x \to$ $\frac{1}{2}$



15. (a) As $x \to (\pi/4)^+$, $\cos x \to$ $\frac{\sqrt{2}}{2}$

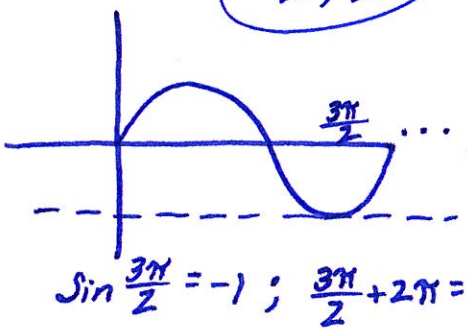


(b) As $x \to \pi^-$, $\cos x \to$ -1



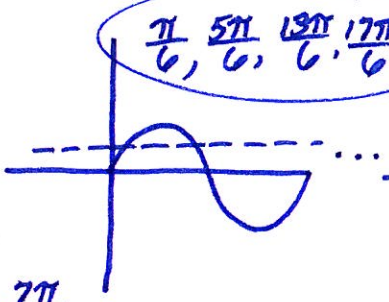
Refer to the graph of y = sin x or y = cos x to find the exact values of x in the interval [0, 4π] that satisfy the equation.

16. sin x = -1 $\frac{3\pi}{2}, \frac{7\pi}{2}$

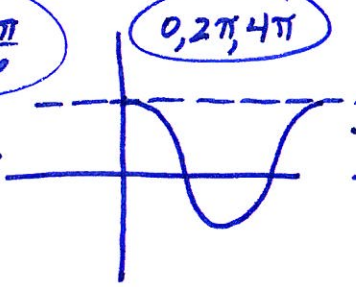


$\sin\frac{3\pi}{2} = -1$; $\frac{3\pi}{2} + 2\pi = \frac{7\pi}{2}$

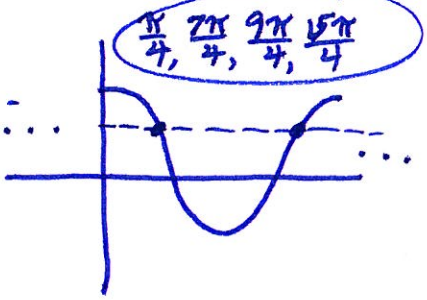
17. sin x = 1/2 $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$



18. cos x = 1 0, 2π, 4π

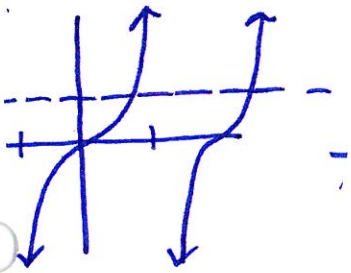


19. cos x = $\sqrt{2}/2$ $\frac{\pi}{4}, \frac{7\pi}{4}, \frac{9\pi}{4}, \frac{15\pi}{4}$

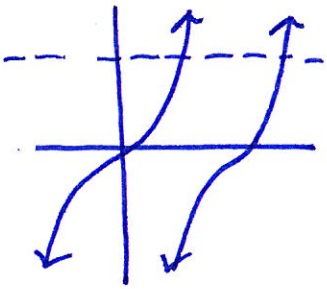


Refer to the graph of y = tan x to find the exact values of x in the interval (-π/2, 3π/2) that satisfy the equation.

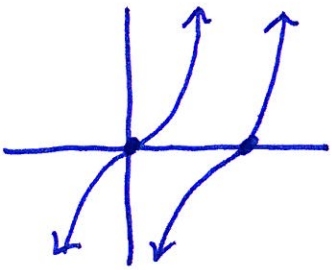
20. tan x = 1 $\frac{\pi}{4}, \frac{5\pi}{4}$



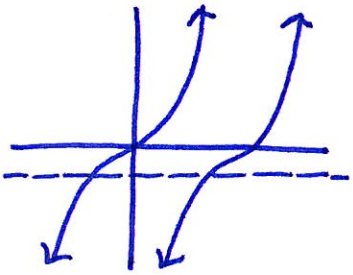
21. tan x = $\sqrt{3}$ $\frac{\pi}{3}, \frac{4\pi}{3}$



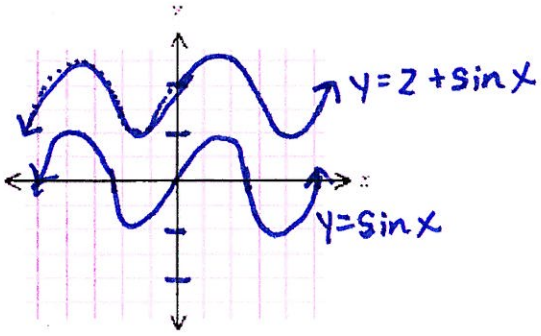
22. tan x = 0 0, π



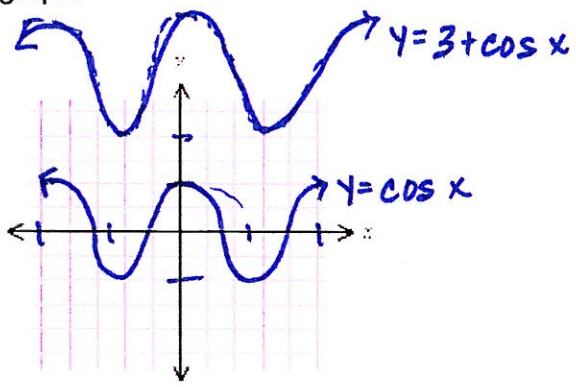
23. tan x = -1 /$\sqrt{3}$ $-\frac{\pi}{6}, \frac{5\pi}{6}$



24. Sketch y = sin x and y = 2 + sin x on the same graph.



25. Sketch y = cos x and y = 3 + cos x on the same graph.



26. Sketch y = tan x and y = 1 + tan x on the same graph.