Name: Key

Math 123: Trigonometry
Midterm Exam # 1
19 September 2013

Follow all instructions. All scratch work should be done on the paper provided. No calculators or other electronic devices. All you need is a pencil and your brain.

Part I: True or False

Read each statement carefully, then write **T** *or* **F** *in the space provided.*

F **1.** Given a point (x, y) on the terminal side of an angle θ in standard position, then $\tan(\theta) = \frac{x}{y}$. $\tan(\theta) = y/x$

T **2.** $\sin^2(\theta) + \cos^2(\theta) = 1$ for every angle θ.

T **3.** For an acute angle α in a right triangle, $\sec(\alpha)$ is equal to the length of the hypotenuse divided by the length of the adjacent side.

F **4.** Two positive angles α and β are called complementary if their sum is equal to π; that is, if $\alpha + \beta = \pi$. Complementary : $\alpha + \beta = \pi/2$

F **5.** $\frac{\pi}{6}$ radians is equal to 60°. $\frac{\pi}{6} = 30°$

Part II: Fill in the Blank

Choose the appropriate word or phrase from the word bank, and write its corresponding letter in the space provided.

Word Bank:

A. unit circle	**B.** triangle	**C.** asymptotic
D. odd	**E.** even	**F.** periodic
G. complementary	**H.** supplementary	**I.** arc length
J. cyclical	**K.** coterminal	**L.** curvature

K **6.** Two angles in standard position are called _____ if they have the same terminal side.

D **7.** A function f is called _____ if $f(-x) = -f(x)$ for all x in the domain of f.

F **8.** A function f is called _____ if there is a number c such that $f(x + c) = f(x)$ for all x in the domain of f.

A **9.** $x^2 + y^2 = 1$ is the equation of the _____ .

I **10.** Let θ be an angle in standard position, and $x^2 + y^2 = r^2$ a circle centered at the origin. The _____ , s, of the curve subtending the angle θ is given by the equation $s = r\theta$.

Part III: Multiple Choice

Write the letter corresponding to the appropriate answer in the space provided.

B **11.** Find a positive and negative coterminal angle for $\theta = \frac{4\pi}{3}$.

A. $\frac{\pi}{3}; \frac{-\pi}{3}$ **B.** $\frac{10\pi}{3}; \frac{-2\pi}{3}$

C. $\frac{10\pi}{3}; \frac{2\pi}{3}$ **D.** $\frac{2\pi}{3}; \frac{-10\pi}{3}$

A **12.** Convert $75°$ to radians.

A. $\frac{15\pi}{36}$ **B.** $\frac{17\pi}{36}$

C. $\frac{7\pi}{5}$ **D.** $\frac{3\pi}{4}$

D **13.** Find the value of the trig function: $\cot(\frac{-\pi}{6})$.

A. $\sqrt{3}$ **B.** $-\frac{\sqrt{3}}{3}$

C. 1 **D.** $-\sqrt{3}$

C **14.** Given that $\sin(\theta) = \frac{3}{5}$ and θ is in quadrant II, find $\tan(\theta)$.

A. $\frac{3}{4}$ **B.** $-\frac{4}{5}$

C. $-\frac{3}{4}$ **D.** $\frac{4}{3}$

D **15.** Let $\theta = \frac{3\pi}{4}$. Find its complement θ_c and supplement θ_s, if they exist.

A. $\theta_c = \frac{\pi}{2}; \theta_s = \pi$ **B.** $\theta_c = -\frac{\pi}{4}; \theta_s = \frac{\pi}{4}$

C. $\theta_c = -\frac{\pi}{4}; \theta_s = \text{DNE}$ **D.** $\theta_c = \text{DNE}; \theta_s = \frac{\pi}{4}$

B **16.** Given that $\sin(\theta) = \frac{11}{13}$, what is $\sin(\pi - \theta)$?

A. $\frac{13}{11}$ **B.** $\frac{11}{13}$

C. $-\frac{11}{13}$ **D.** $\frac{4\sqrt{3}}{13}$

D **17.** What is the reference angle θ' for $\theta = -765°$?

A. $-65°$ **B.** $60°$

C. $-45°$ **D.** $45°$

C **18.** Explain how the graph of the function $y = 2 + \sin(x - \frac{\pi}{2})$ differs from the graph of $y = \sin(x)$.

A. down $\frac{\pi}{2}$; right 2 **B.** up 2; left $\frac{\pi}{2}$

C. up 2; right $\frac{\pi}{2}$ **D.** down 2; left $\frac{\pi}{2}$

Part IV: Short Answer

Show enough work. Clearly mark your final answers. Partial credit given when deserved.

19. Given that θ is in quadrant II and its terminal side coincides with the line $y = -4x$, find the values of all 6 trig functions.

Pt: $(x, y) = (-1, 4)$

$r = \sqrt{1^2 + 4^2} = \sqrt{17}$

$\cos\theta = \frac{-1}{\sqrt{17}}$ $\sec\theta = -\sqrt{17}$

$\sin\theta = \frac{4}{\sqrt{17}}$ $\csc\theta = \frac{\sqrt{17}}{4}$

$\tan\theta = -4$ $\cot\theta = -\frac{1}{4}$

20. Let $(-15, -8)$ be a point on the terminal side of an angle θ in standard position. Find the values of all 6 trig functions at θ. [Hint: $17^2 = 289$.]

$r = \sqrt{15^2 + 8^2} = \sqrt{225+64} = \sqrt{289} = 17$

$\cos\theta$	$= \frac{-15}{17}$	$\sec\theta$	$= \frac{-17}{15}$
$\sin\theta$	$= \frac{-8}{17}$	$\csc\theta$	$= \frac{-17}{8}$
$\tan\theta$	$= \frac{8}{15}$	$\cot\theta$	$= \frac{15}{8}$

21. Determine the (a) frequency, (b) period, and (c) amplitude of the curve

$$y = -2\cos\left(\pi x - \tfrac{\pi}{2}\right) + 1. \quad = -2\cos\left(\pi\left[x - \tfrac{1}{2}\right]\right) + 1$$

(d) How much is the graph shifted horizontally, and in which direction?

a) $f = b = \boxed{\pi}$

b) $p = \frac{2\pi}{b} = \frac{2\pi}{\pi} = \boxed{2}$

c) $a = |-2| = \boxed{2}$

d) shift right by ½ unit