Monday, Feb 14th

Math 112, Section _____ _____ Name: Answers

Test 1, version A, Spring 2011 100

Chapter 7 sections 1-5, and chapter 5 sections 5-6 Seat location: _____

Show all necessary work. Full credit is based on work shown!

12pts (3 pts each)

1. Conversions:

a. Express 150° in radian measure.

$150^\circ \cdot \frac{\pi}{180}$ radians $= \frac{5\pi}{6}$ radians

b. Express $\frac{5\pi}{4}$ radians in degrees.

$\frac{5\pi}{4} = \frac{5}{4}(180) = 225^\circ$

c. Convert 64° 45′ 15″ to decimal form.

decimal form should convert back to.

$64^\circ + \frac{45}{60} + \frac{15}{(60)^2}$

$64^\circ + .75 + .00416\overline{6}$

$64.75416\overline{6}^\circ$

ok if rounded to 64.75442 -1 pt if rounded more

d. Convert 53.82° to degrees, minutes, and seconds.

$53^\circ + .82(60)$

$53^\circ\ 49' + .2(60)''$

$53^\circ\ 49'\ 12''$

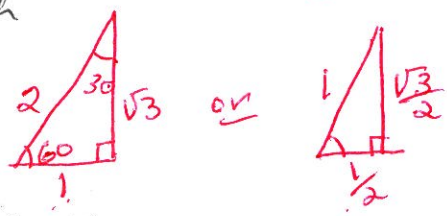
10pts (5 pts each)

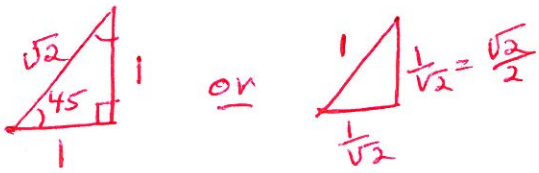
2. Give the **exact value** for each of the following trig functions (without using a calculator). **Draw and label the sides of an appropriate right triangle.**

a. $\sec 60^\circ = \frac{1}{\cos 60^\circ} = \frac{1}{\frac{1}{2}} = 2$

b. $\csc 45^\circ = \frac{1}{\sin 45^\circ} = \sqrt{2}$

2pts trig value
3pts = sketch





12 pts (6 each)

3. Give **exact value** for each **trig function**, without using a calculator. Draw and label a sketch to illustrate each one. (Your sketch should illustrate the angle and its reference angle.)

3pts

a. $\tan 210^\circ = \frac{+1}{\sqrt{3}}$ or $+\frac{\sqrt{3}}{3}$

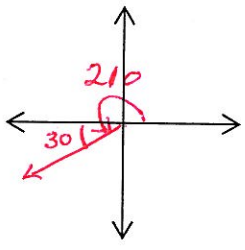
1pt reference ∠ = 30°

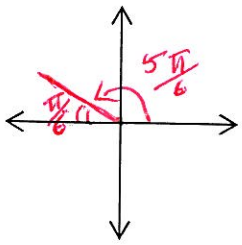
b. $\sec\left(\frac{5\pi}{6}\right) = \frac{-2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$

reference ∠ = $\frac{\pi}{6}$ count ok if 30°

2 pts sketch

(-1 if in wrong quadrant but ref ∠ is correct size)





Count ok if labeled ref △ instead of just labeling ∠s.

2pts or 2nd & 3rd

5pts

4. The cosine function is negative in what quadrants? II III Explain:

3pts { the cosine is negative in the quadrants where the x coordinate is neg.

(−, +) | (−, −)

−1pt if just have sketch & no explanation

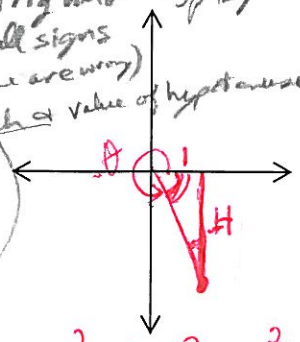
12pts

5. a. If $\tan\theta = -\frac{4}{1}$ and $\sin\theta < 0$, angle θ is in what quadrant? ~~II~~ IV 1pt

~~II~~ IV III & IV

b. Draw a sketch to illustrate angle θ and its reference angle (and triangle), then find the **exact value of the remaining five trigonometric functions of θ.** (Do not use a calculator.)

1pt each trig value (5pts)
2pts for all signs
(−1 if some are wrong)
4pts sketch & value of hypotenuse



$1^2+(-4)^2=c^2$ or r^2

$1+16=17=c^2$

$c=\sqrt{17}$

$\sin\theta = \frac{-4}{\sqrt{17}}$ or $-\frac{4\sqrt{17}}{17}$

$\cos\theta = \frac{1}{\sqrt{17}}$ or $\frac{\sqrt{17}}{17}$

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

$\sec\theta = \sqrt{17}$

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

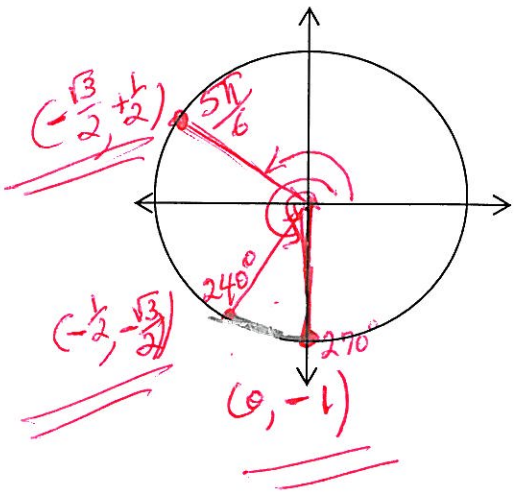
12pts

6. Sketch each angle and label the coordinates for each appropriate point on this unit circle.

1pt for location of each angle

a. 270° b. 240° c. $\left(\frac{5\pi}{6}\right)$ radians

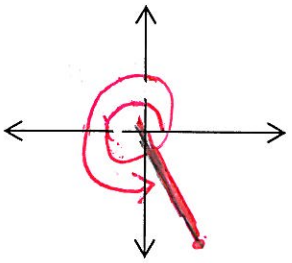
3pts for labeling each point with correct #s and signs



9pts

7. Sketch the angle and then find the exact value for each :

sketch 3pts



Note: ref ∠ is $\frac{\pi}{3}$ or 60°

a. $\cos\left(\frac{11\pi}{3}\right) =$ $+\frac{1}{2}$ 3pts

b. $\tan\left(\frac{11\pi}{3}\right) =$ $-\sqrt{3}$ 3pts

note: $\frac{11}{3} = 3\frac{2}{3}$

$\frac{11\pi}{3} = 2\pi + 1\frac{2}{3}\pi$

$\frac{6\pi}{3} + \frac{5\pi}{3}$

$\cot 55^\circ \cdot \frac{1}{\cos 55^\circ} \cdot \sin 55^\circ = \frac{\cos 55}{\sin 55} \cdot \frac{1}{\cos 55} \cdot \sin 55^\circ = 1$

or (Cofunctions of complementary $\angle$s are =.)

4pts

8. Find the exact value of this expression using the Fundamental Identities and/or the Complementary Angle Theorem. Show your steps to indicate which identities you used. Do NOT use a calculator. 3pts

$\tan 35^\circ \cdot \sec 55^\circ \cdot \cos 35^\circ =$ $\tan 35^\circ \cdot \csc 35^\circ \cdot \cos 35^\circ = \frac{\sin 35}{\cos 35} \cdot \frac{1}{\sin 35} \cdot \cos 35^\circ$

($\cos 35^\circ = \sin 55^\circ$ or $\sec 55^\circ = \csc 35^\circ$) (also $\tan\theta = \frac{\sin\theta}{\cos\theta}$ so)

$= 1$ 1pt

9pts

9. **Use a calculator** to find the approximate value of each expression. Show how you are calculating each of these and **round each answer to four decimal places.** (3pts each)

a. $\cos 14^\circ =$ .9703 mode degree

b. $\sin\left(\frac{3\pi}{10}\right) =$ .8090 mode radians

c. $\cot\left(\frac{11\pi}{12}\right) = \frac{1}{\tan\left(\frac{11\pi}{12}\right)} = \frac{1}{-.267949\ldots} = -3.7321$

−1pt if mode in degrees & got $\sin\left(\frac{3\pi}{10}\right) = .0164$

−1pt if degree mode ⇒ 19.8790

15pts

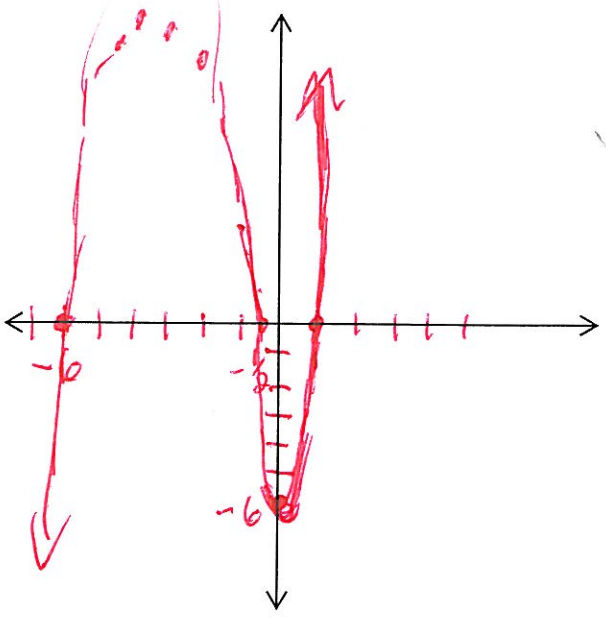
10. $f(x) = 2x^3 + 11x^2 - 7x - 6$

1pt a. What is the maximum number of zeros of f(x)? 3

4pts b. List all possible rational zeros for f(x): factors of 6 / factors of 2 $= \frac{\pm 1, \pm 2, \pm 3, \pm 6}{\pm 1, \pm 2}$

thus $\pm 1, \pm 2, \pm 3, \pm 6, \pm\frac{3}{2}, \pm\frac{1}{2}$

c. Sketch a graph of f(x) 4pts



d. What are the real zeros of f(x)? 3pts

$x = -6, -\frac{1}{2}, +1$

could show synthetic ÷ or use graph to justify $f(-6) = 0$ etc

e. Write f(x) in completely factored form. 3pts

$f(x) = (x+6)(x+\frac{1}{2})(x-1)$

$f(x) = (x+6)(2x+1)(x-1)$