

(General rule: -1 pt for each small error)

Math 112, Section _____
 Test 1, version A, spring 2012 100

Name: Answers

Chapter 7 sections 1-5, and chapter 5 sections 5-6

Seat location: _____
 (letter A-G & number 1-5)

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

12pts (3pts each)

1. Conversions:

a. Express 225° in radian measure.

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

b. Express $\frac{7\pi}{3}$ radians in degrees.

$$\frac{7(180^\circ)}{3} = 420^\circ$$

c. Convert $46^\circ 34' 12''$ to decimal form.

-1 pt if 12/60

$$\frac{34'}{60} = 0.56666\dots$$

$$\frac{12''}{3600} = 0.003333\dots$$

$$0.56999\dots$$

$$46.57^\circ$$

10pts

d. Convert 17.255° to degrees, minutes, and seconds.

-1 pt if rounded so conversion is not accurate to nearest second.

$$0.255(60') = 15.3'$$

$$0.3(60'') = 18''$$

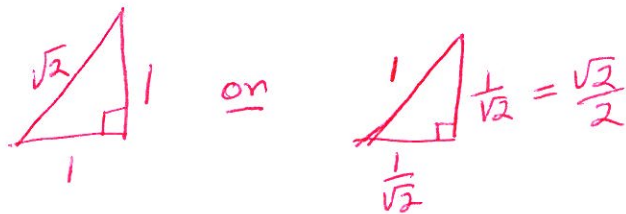
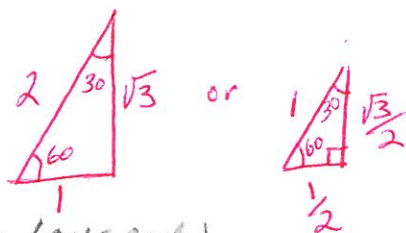
$$17^\circ 15' 18''$$

2. Give the exact value for each of the following trig functions (without using a calculator).

5pts each
 3pts labeled sketch
 2pts trig value.

a. $\sec 30^\circ = \frac{2}{\sqrt{3}}$ or $\frac{2\sqrt{3}}{3}$

b. $\cot 45^\circ = 1$



12pts (6pts 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.)

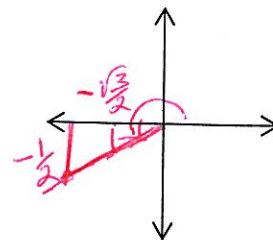
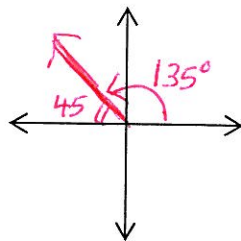
3pts a. $\tan 135^\circ = -1$

1pt reference $\angle = 45^\circ$

b. $\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$

reference $\angle = \frac{\pi}{6}$

2pts sketch



-1pt if in wrong quad but ref \angle is OK

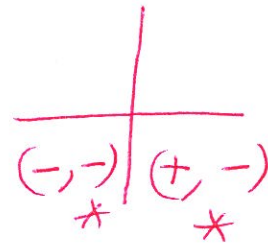
-1pt if right quad but ref \angle is wrong

5pts

4. The sine function is negative in what quadrants? III, IV

Explain:

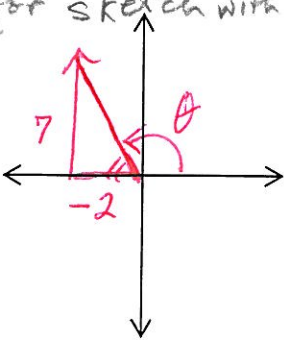
The sine is negative where the y-coordinate (for the point on the terminal side of the angle) is negative.



3pts

5. a. If $\tan \theta = -\frac{7}{2}$ and $\sin \theta > 0$, angle θ is in what quadrant? II

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.)



$$\begin{aligned} 2^2 + 7^2 &= c^2 \\ 4 + 49 &= c^2 \\ 53 &= c^2 \\ \sqrt{53} &= c \end{aligned}$$

$$\sin \theta = \frac{7}{\sqrt{53}} \text{ or } \frac{7\sqrt{53}}{53}$$

$$\cos \theta = -\frac{2}{\sqrt{53}} \text{ or } -\frac{2\sqrt{53}}{53}$$

$$\tan \theta = -\frac{7}{2}$$

$$\csc \theta = \frac{\sqrt{53}}{7}$$

$$\sec \theta = \frac{\sqrt{53}}{-2}$$

$$\cot \theta = -\frac{2}{7}$$

5pts for trig values

2pts for correct signs

12pts (4pts each)

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

9pts (3pts each part) *

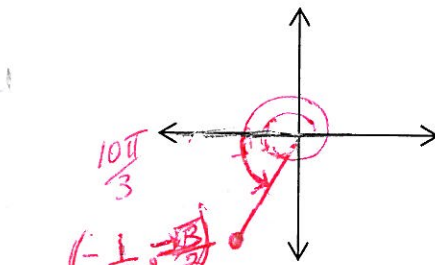
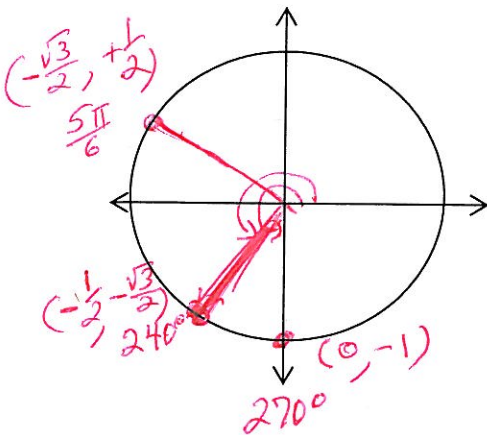
7. Sketch the angle and then find the exact value for each:

a. 270°

b. 240°

c. $\left(\frac{5\pi}{6}\right)$ radians

(ref $\angle 60^\circ$) (ref $\angle \frac{\pi}{6}$) ← optional



note! ref \angle is $\frac{\pi}{3}$ or 60°

optional \rightarrow

$$\text{a. } \cot\left(\frac{10\pi}{3}\right) = \cot\frac{4\pi}{3} = +\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\text{b. } \csc\left(\frac{10\pi}{3}\right) = \csc\frac{4\pi}{3} = -\frac{2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$$

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

$$\begin{aligned} \frac{10\pi}{3} &= \frac{6\pi}{3} + \frac{4\pi}{3} \\ &= 2\pi + \frac{4\pi}{3} \end{aligned}$$

$$600^\circ = 360^\circ + 240^\circ$$

1pt for correct location of \angle ,
3pts for correct label of pt
& with correct sign.

(7.2#37-54)

4pts

1 pt for showing each step.

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.

$\cot 25^\circ \cdot \csc 65^\circ \cdot \sin 25^\circ =$

$\frac{\cos 25^\circ}{\sin 25^\circ} \cdot \frac{1}{\cos 25^\circ} \cdot \sin 25^\circ = \frac{\cos 25^\circ}{\sin 25^\circ} \cdot \frac{1}{\cos 25^\circ} \cdot \frac{\sin 25^\circ}{1} = 1$

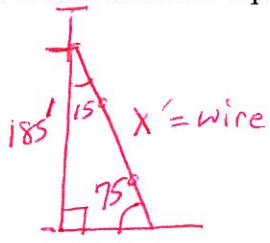
7pts

9. Draw a sketch and use trig to solve this problem: (Show your work.)

(7.3#79)

A radio transmission tower is 200 feet high. How long should a guy wire be if it is to be attached to the tower 15 feet from the top and is to make an angle of 75° with the ground?

3 pts sketch
4 pts soln.



$\sin 75^\circ = \frac{185}{x}$
 $x \sin 75^\circ = 185^\circ$
 $x = \frac{185^\circ}{.9659...}$

$x = 191.526... \text{ ft}$
 $x \approx 192 \text{ ft.}$

17pts

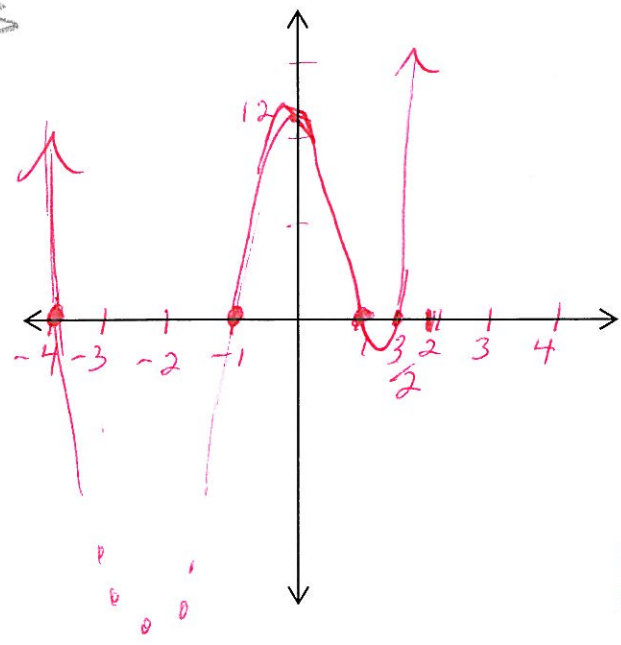
10. $f(x) = 2x^4 + 5x^3 - 14x^2 - 5x + 12$

1 pt
4 pts

- a. What is the maximum number of zeros of $f(x)$? 4
- b. List all possible rational zeros for $f(x)$: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{2}, \pm \frac{3}{2}$
- $\frac{\text{factors of } 12}{\text{factors of } 2} = \frac{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12}{\pm 1, \pm 2} =$

c. Sketch a graph of $f(x)$

4pts



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

4pts $x = -4, -1, +1, +\frac{3}{2}$

[Could use graph, table of values or synthetic \div to confirm zeros]

4pts

e. Write $f(x)$ in completely factored form.

$f(x) = (x+4)(x+1)(x-1)(2x-3)$
 or $2(x-3)$

-1 pt if left out factor of 2

or $f(x) = 2(x+4)(x+1)(x-1)(x-\frac{3}{2})$