

**Show all your work. Full credit is based on work shown!**

4pts

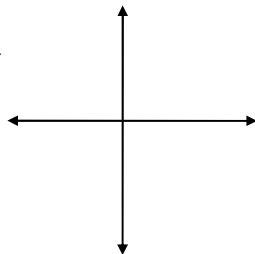
1. a. Draw a sketch of the angle  $\frac{13\pi}{12}$ .                      b. What is this angle expressed in degrees?

6pts

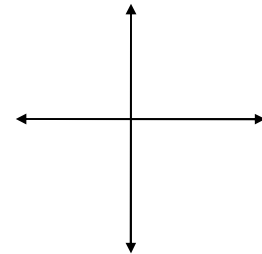
2. **Evaluate** (without a calculator) giving the **exact value** for each of the following.

(Draw and label the sides of the reference triangle.)

a.  $\cos 330^\circ =$  \_\_\_\_\_



b.  $\tan \frac{3\pi}{4} =$  \_\_\_\_\_



18pts

3. a. If  $\sin \theta = -\frac{5}{6}$  and  $\cos \theta < 0$ , angle  $\theta$  is in what quadrant? \_\_\_\_\_

b. Draw and label the sides of the reference triangle.

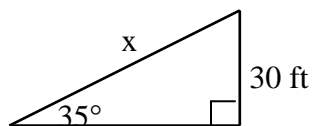
d.  $\cos 2\theta =$  \_\_\_\_\_

- c. Determine the exact value of the remaining five trig functions of  $\theta$ .

e.  $\cos\left(\frac{\theta}{2}\right) =$  \_\_\_\_\_

4pts

4. Solve for x in this right triangle.

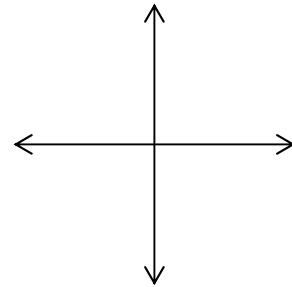
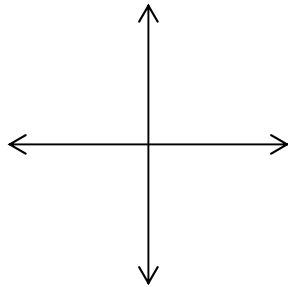


6pts

5. Evaluate without a calculator. Give answers in radian measure in terms of  $\pi$  and sketch ref triangle.

a.  $\cos^{-1}\left(\frac{-\sqrt{2}}{2}\right) =$

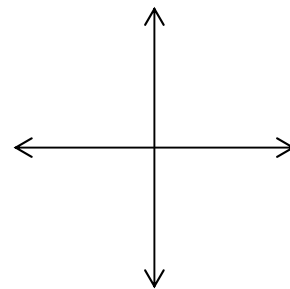
b.  $\tan^{-1}\sqrt{3} =$



6pts

6. Plot the point; then convert from rectangular to polar coordinates.

If  $(x, y) = (-4\sqrt{3}, -4)$  then  $(r, \theta) =$



13pts

7. For each of the following functions, graph at least two periods (one period in the positive x direction and one period in the negative x direction.) Find the pertinent information (amplitude, period, divisions of period, etc.) **Label the axes with appropriate values.**

Asymptotes should be dashed lines. Plot appropriate points ( x intercepts, max, min, etc)

a.  $y = \frac{3}{2} \cos(2x + \pi) = \frac{3}{2} \cos 2\left(x + \frac{\pi}{2}\right)$

period: \_\_\_\_\_

amplitude: \_\_\_\_\_

phase shift : \_\_\_\_\_

$\frac{x}{y}$

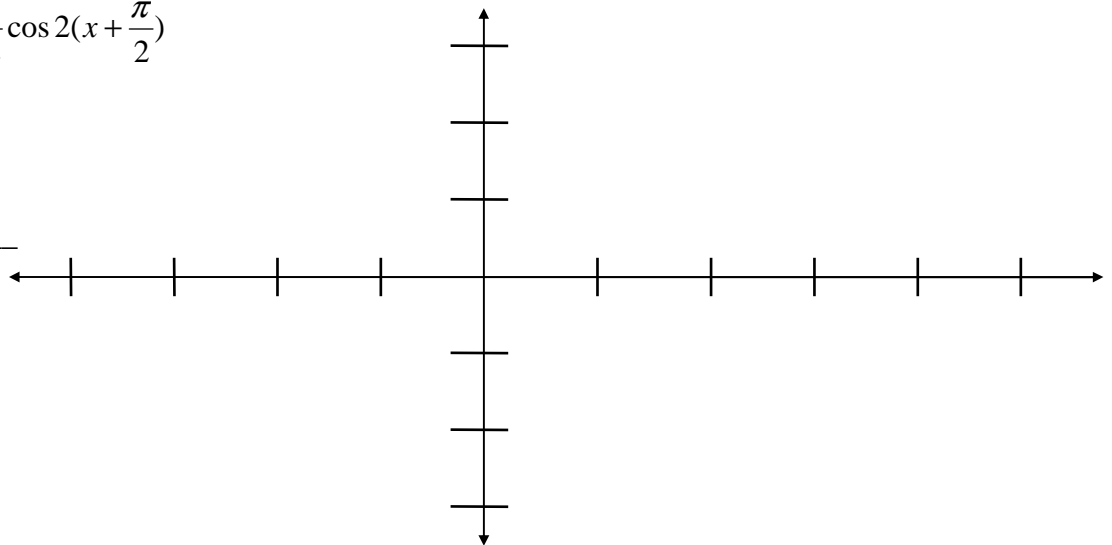


b.  $y = \frac{3}{2} \sec(2x + \pi)$

b.

$= \frac{3}{2} \sec 2\left(x + \frac{\pi}{2}\right)$

$\frac{x}{y}$



4pts

8. Use the sum or difference identities to write the expression as a function of a single angle. Then give the **exact value** of the trigonometric function.

a.  $\frac{\tan 50^\circ + \tan 100^\circ}{1 - \tan 50^\circ \tan 100^\circ} = \underline{\hspace{2cm}}$   
 $= \underline{\hspace{2cm}}$

b.  $\cos 15^\circ \cos 30^\circ - \sin 15^\circ \sin 30^\circ = \underline{\hspace{2cm}}$   
 $= \underline{\hspace{2cm}}$

6pts

9. Use the sum or difference formulas **or** half angle formulas to determine the **exact value** of the  $\cos 165^\circ$ .

10pts Show all your work.

10. Establish the following identities.

a.  $\sin \theta (\cot \theta + \tan \theta) = \sec \theta$

b.  $\cot \theta - \tan \theta = \frac{1 - 2 \sin^2 \theta}{\sin \theta \cos \theta}$

10pts Show all your work.

11. Solve the following trigonometric equations

in the interval  $0 \leq \theta < 2\pi$ .

(Use your calculator & draw a sketch.)

a.  $\sin \theta = -0.81$

b.  $2 \sin^2 \theta + \sin \theta - 1 = 0$

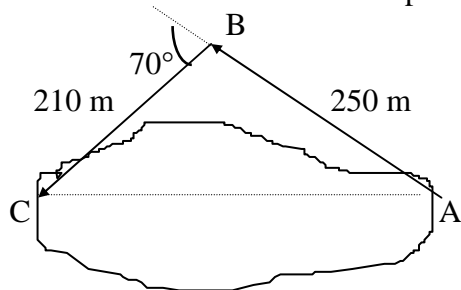
14pts

12. Solve the triangle for all sides and angles not given. If two solutions exist, find both.

$A = 20^\circ$ ,  $a = 12$  inches, and  $b = 31$  inches. Show a sketch of the triangle(s).

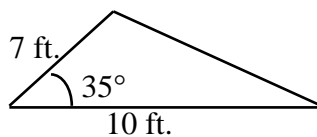
8pts

13. To approximate the length of a marsh, a surveyor walks 250 meters from point A to point B, then turns  $70^\circ$  and walks 210 meters to point C. Calculate the approximate length AC across the marsh.



5pts

14. Find the area of this triangle. (Note: this is not a right triangle.)



18pts

15. a. **Continue each sequence by giving the next three terms. Then write a formula for the  $n$ th term and give the 15<sup>th</sup> term for each sequence**

$$8, 11, 14, 17, 20, 23, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \quad a_n = \underline{\hspace{2cm}} \quad a_{15} = \underline{\hspace{2cm}}$$

$$5, \frac{5}{3}, \frac{5}{9}, \frac{5}{27}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \quad a_n = \underline{\hspace{2cm}} \quad a_{15} = \underline{\hspace{2cm}}$$

$$\frac{4}{1}, \frac{6}{3}, \frac{8}{5}, \frac{10}{7}, \frac{12}{9}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \quad a_n = \underline{\hspace{2cm}} \quad a_{15} = \underline{\hspace{2cm}}$$

8pts

- b. For each of the **first two** sequences in part a, calculate the **sum of the first 15 terms**. Show your calculations using a sum formula or show what you typed into your calculator to find the sum.

5pts

16. Write the first five terms of the recursively defined sequence with  $a_1 = 2$  and  $a_n = (-3) \cdot a_{n-1}$ .

5pts

17. Write the 3<sup>rd</sup> term in the expansion of  $(3x - 2)^9$ .