Part I. There are 8 problems in Part I, each worth 5 points. No partial credit will be given, so be careful. Circle the correct answer.

1) Determine an equivalent expression for $\sin(\theta - \frac{\pi}{2})$.

   a) $\sin \theta$ b) $\cos \theta$ c) $-\sin \theta$ d) $-\cos \theta$ e) Not a, b, c, or d

2) If θ is an acute angle and $\cos\theta = \frac{1}{5}$, what is $\sin\theta$?

   a) $\frac{24}{5}$ b) $\frac{4}{5}$ c) $\frac{24}{25}$ d) $\frac{\sqrt{24}}{5}$ e) Not a, b, c, or d
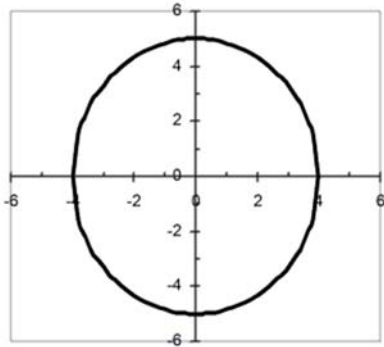
3) Find the dot product of u and v if $\vec{u} = < 2, -3 >$ and $\vec{v} = < 1, -2 >$.
   a)   6
   b)   -1
   c)   <3, 3>
   d)   8
   e)   Not a, b, c, or d

4) Find the supplement of $\frac{2\pi}{5}$.

   a) $\frac{3\pi}{5}$ b) $\frac{\pi}{10}$ c) $\frac{-2\pi}{5}$ d) $\frac{\pi}{5}$ e) Not a, b, c, or d

5) What is the equation for the following graph?

a) $\frac{x^2}{5} + \frac{y^2}{4} = 1$ b) $\frac{x^2}{25} + \frac{y^2}{16} = 1$ c) $\frac{x^2}{4} + \frac{y^2}{5} = 1$ d) $\frac{x^2}{16} + \frac{y^2}{25} = 1$ e) Not a, b, c, or d

6) Which of the following are coterminal to an angle of 70 degrees?

a) 20 degrees   b) -290 degrees   c) -430 degrees   d) 290 degrees   e) Not a, b, c or d

7) Find the directrix of the parabola $y^2 = -8(x + 1)$.

a) y= -1   b) x = 1   c) y = 1   d) y = -2   e) Not a, b, c, or d

8) What is the phase shift for the graph: $y = -3 \sin(2x - 3) + 5$?
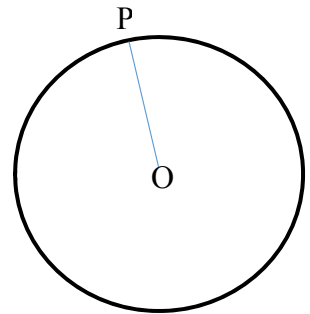
a) 5   b) 3/2   c) 3   d) -3/2   e) not a,b,c or d

Part II. Partial credit will be given here. Show all your work. Each problem is worth 6 points.

9)   Given vectors $u = \langle -2,4 \rangle$ and $v = \langle -1,-1 \rangle$ what is $< 3u - 2v >$?

10) Suppose that P is a point on a circle with a radius of 6 inches and the ray OP is rotating with angular speed 60 degrees per second. (Round to nearest tenth.)

a) Find the speed in radians per second.

b) Find the distance travelled by P along the arc after 5 seconds.
    (i.e. Arc length.)

11) Given $cos\theta = .22$, state the solution set on $[0,360°)$. Approximate to nearest tenth of a degree. Show all work clearly.

12) If the rectangular coordinates of a point are $(-2, -2)$, what are its polar coordinates (r, θ) given the following?

a) $r > 0,\ 0 \le \theta < 2\pi$

b) $r < 0,\ 0 \le \theta < 2\pi$

13) Rationalize the denominator .
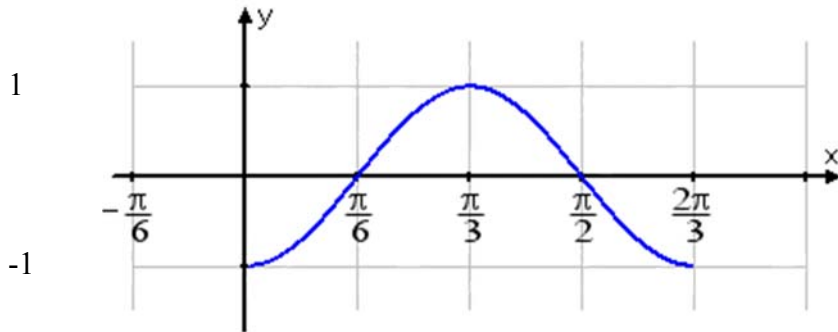
$$\frac{\sqrt{1-\sin(x)}}{\sqrt{1+\sin(x)}}$$

14) Perform the indicated operation:
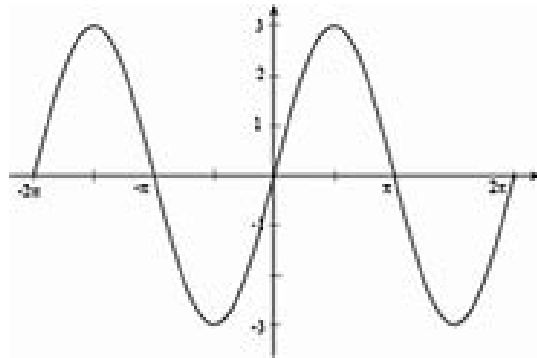
a)   Factor: $2\sin^2 x - 3\cos x \sin x - 2\cos^2 x$

b)   Simplify: $\frac{\cos^2 x + \sin^2 x}{1-\sin^2 x}$

Part III. Partial credit will be given here. Show all your work. Each problem is worth 12 points.

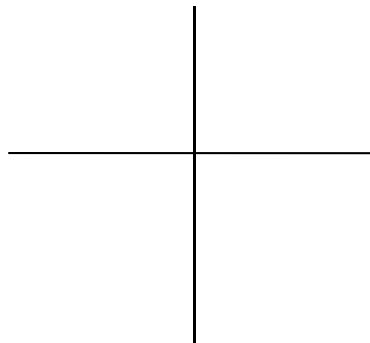15) Write an equation for each.

a)   Answer _____

b)   Answer _____

c)   Graph $f(x) = \cos^{-1}x$.
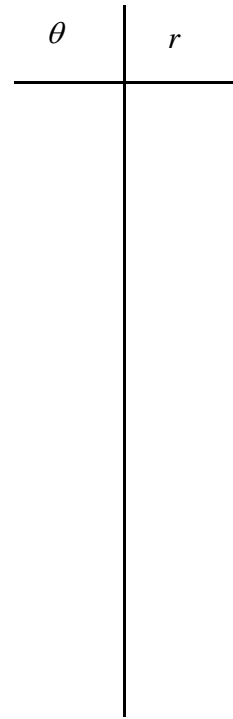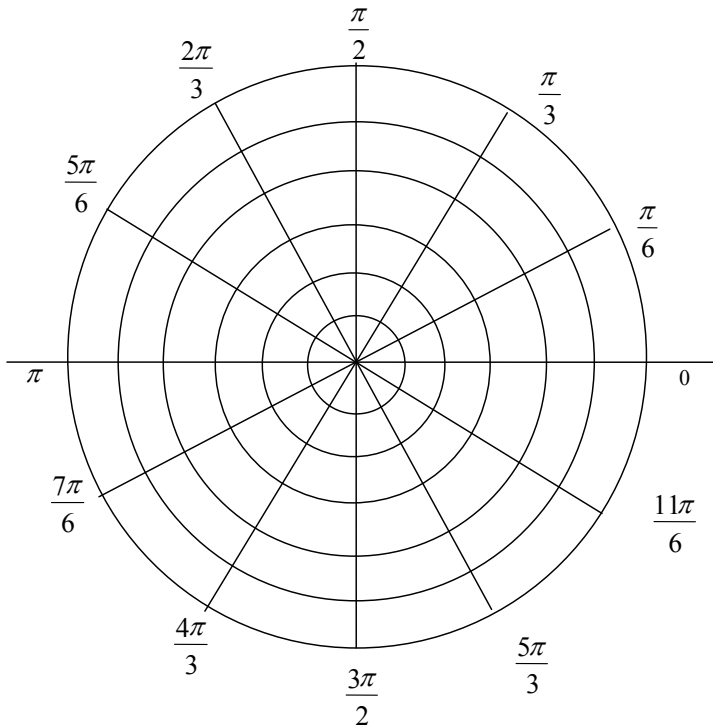   Label axes with at least 2 ticks each.

16) Given that $\cos(x) = \frac{2}{9}$ and x is a quadrant I angle, $\cos(y) = \frac{4}{5}$ where y is in quadrant IV angle. Give exact values!!! You should not need a calculator.

a) Find $\sin(2y)$.   b) Find $\sin(x + y)$.

17) Verify (prove): $cot^2(x) = \frac{csc^2(x)}{1+tan^2x}$. Include all steps and explanations.

18) a)   Graph the polar equation $r = 2\sin(\theta)+2$ on the axes below. (7 pts)

θ	r

b) Convert the following polar form into rectangular form: $(5, 150^0)$ (5 pts)

19) Solve the following.
   a)   Find **all** solutions to $4\cos^2 x - 3 = 0$. (6 pts)   Note: **All solutions** are the same
        Express in terms of degrees.   as **general solutions.**

b) $2\sin^2 x = 1 - \sin x$ on $[0, 2\pi)$ (6 pts)

20) Solve the triangle ABC with sides $a = 6cm, b = 7cm, c = 4cm$. Round all answers to the nearest tenth (one decimal place).

A=

B=

C=

21) Change: $4(x - 3)^2 + 8y^2 = 40$ into standard form. Then graph. Label vertices or center as well as any foci.
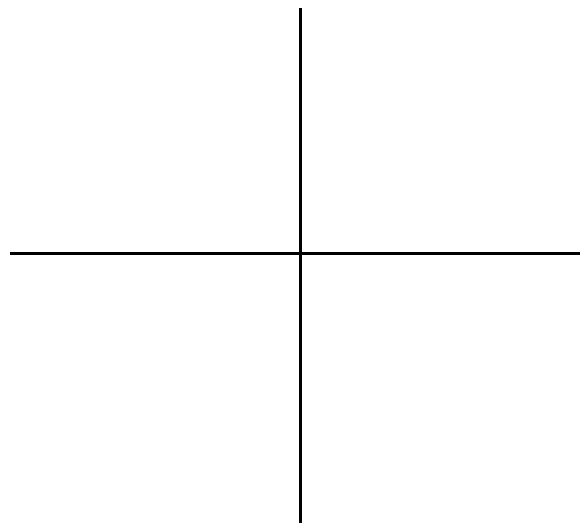
***PART IV. Here are 6 problems.   Do any 4, but only 4. Each is worth 10 points.
Be sure to check the box for each problem to be graded.***

☐

Grade

22) Find cube roots of $2 - 2i$. Leave answers in trig form. (Exact answers in degrees.)

☐

Grade

23) Graph the following. Indicate and label all critical information.

$$\frac{(y-2)^2}{16} + \frac{x^2}{9} = 36$$
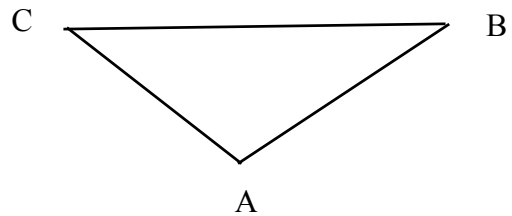
- Center:_____

- Vertices:_____

- Foci:_____

(REMDINDER: Do 4 of the 6 problems in this section and check the box next to the ones I should grade!)

☐

Grade   24) Write the trigonometric expression as an algebraic expression in terms of
$u(u > 0)\csc(\tan^{-1} u)$.

☐

Grade   25) Points A & B are on opposite sides of a lunar crater. Point C is 40 m from point A. The measure of angle BAC is 110 degrees and the measure of angle ABC is 38 degrees. What is the width of the crater (distance from point A to B)?

C   B

A

(REMINDER: Do 4 of the 6 problems in this section and check the box next to the ones I should grade!)

☐

Grade

26) Prove the following identity. $\dfrac{tanx - cotx}{sinxcosx} = sec^2x - csc^2x$

☐

Grade

27) Two forces of 48 N and 35 N act on objects at right angles. (Round to nearest tenth and use degrees.)

a) Find the magnitude of the resultant vector.   b) Find the angle the resultant vector makes with the smaller force.