

**Part I. There are 10 problems in Part I. Little partial credit will be given, so be careful.**

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[9] 1) Fill in the table: EXACT ANSWERS

	$\Theta = 30^\circ$	$\Theta = 45^\circ$	$\Theta = 60^\circ$
$\sin \Theta$			
$\cos \Theta$			
$\tan \Theta$			

2) Perform the indicated operation:

[5] a) Graph  $\sin(x)$  through one period.

[5] b) Graph  $\cos(x)$  through one period.

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

[5] 4) Find the dot product of  $u$  and  $v$  if  $\vec{u} = \langle 2, -3 \rangle$  and  $\vec{v} = \langle 1, -2 \rangle$ .

[8] 5) If  $\cos(\Theta) = 4/7$  and  $\Theta$  is in **quadrant 4**, find:

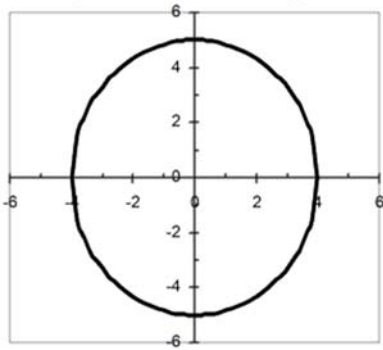
a)  $\sin(\Theta)$

c)  $\sec(\Theta)$

b)  $\tan(\Theta)$

d)  $2\cos(\Theta) - 1$

[5] 6) What is the equation for the following graph? <5 points>



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 listed

[5] 7) Which of the following are coterminal to an angle of 70 degrees?

a) 20 degrees

b) 110 degrees

c) 430 degrees

d) 290 degrees

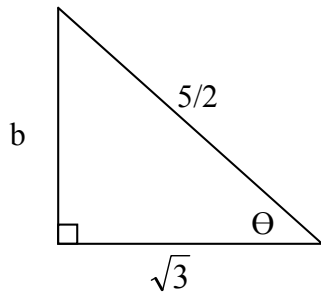
e) Not a, b, c or d

[5] 8) Write  $\frac{2\pi}{5}$  in degrees. \_\_\_\_\_

[5] 9) What is 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

[7] 10) Find the length of side b and  $\tan(\Theta)$ .



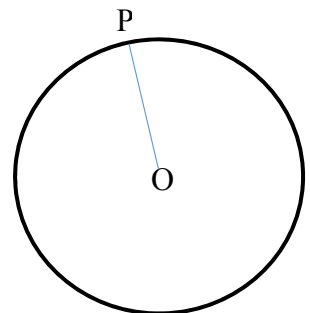
***Part II. Show all your work. Each problem is worth 6 points.***

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[6] 11) Given  $u = \langle -2, 4 \rangle$  and vector  $v = \langle -1, -1 \rangle$  what is  $|4u - v| = ?$

[6] 12) Suppose that P is a point on a circle with a radius of 10 inches and the ray OP is rotating with angular speed 100 degrees per second.

- a) Find the speed in radians per second.



- b) Find the distance travelled by P along the arc after 1 second.

[6] 13) Given  $\sin x = 0.2$ , state the solution set on  $[0, 360^\circ)$ . Approximate to nearest degree. Show all work clearly.

[6] 14) If the rectangular coordinates of a point are  $(4, -4)$ , what are its polar coordinates  $(r, \theta)$  given the following?

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

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

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

[6] 16) Perform the indicated operation:

a) Factor:  $2\sin^2 x - 4\cos x \sin x$

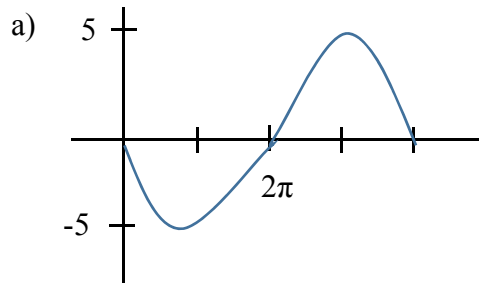
b) Simplify:  $\frac{\cos^2 x}{1 - \sin^2 x}$

**Part III. Partial credit will be given here. Show all your work.**

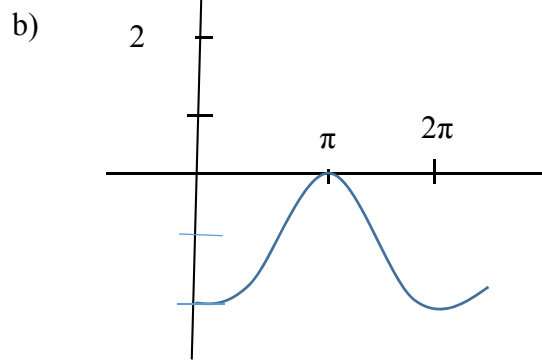
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[12] 17) Write an equation for each.

Answer \_\_\_\_\_



Answer \_\_\_\_\_



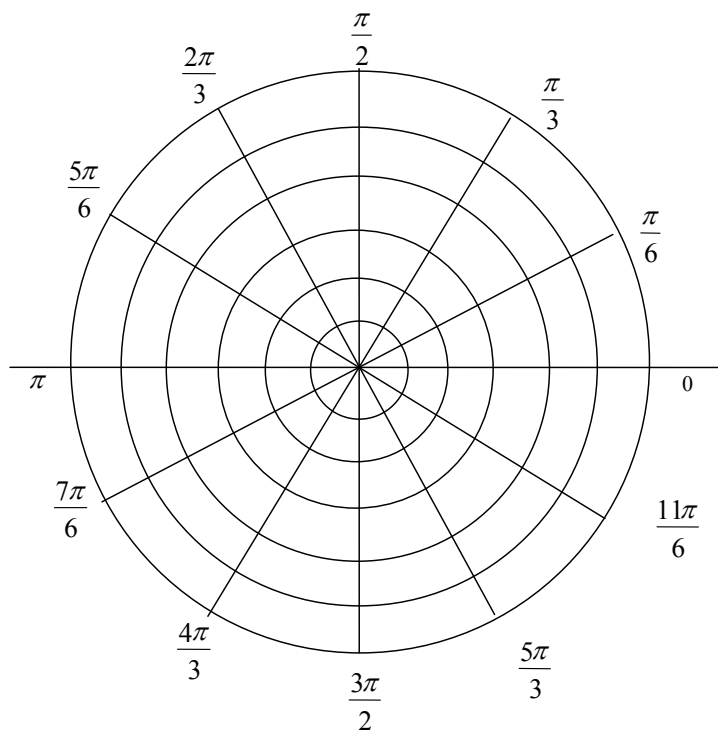
c) Graph  $f(x) = \sin^{-1}x$ .  
Label axes with at least 2 ticks each.

18) [4] a) Write in rectangular form:  $(2, 120^\circ)$  [4]b) convert to polar equation:  $x^2 + y^2 = 36$

[8] 19) Verify (prove):  $\frac{\tan x - \cot x}{\sin x \cos x} = \sec^2 x - \csc^2 x$

Include all steps and explanations

[7] 20) a) Graph the polar equation  $r = 4 \sin \theta$  on the axes below.



21) Solve the following.

- [5] a) Find **all** solutions to  $4\cos^2 x - 3 = 0$ . Note: **All solutions** are the same as **general solutions**.  
Express in terms of **degrees**.

[5] b)  $2\sin^2 x = 1 - \sin x$  on  $[0, 2\pi)$

[6] 22) Solve the RIGHT triangle, ABC:  $a = 12$  inches,  $b = 9$  inches. Round to two decimal places. Use degrees and put units on answers.

$c =$  \_\_\_\_\_

$C = 90$  degrees

$A =$  \_\_\_\_\_

$B =$  \_\_\_\_\_

[6] 23) Change  $2y^2 - 12x + 3x^2 = 6$  into standard form. Identify the graph as an ellipse, circle, parabola. Then graph (include center and foci if necessary).

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***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.***

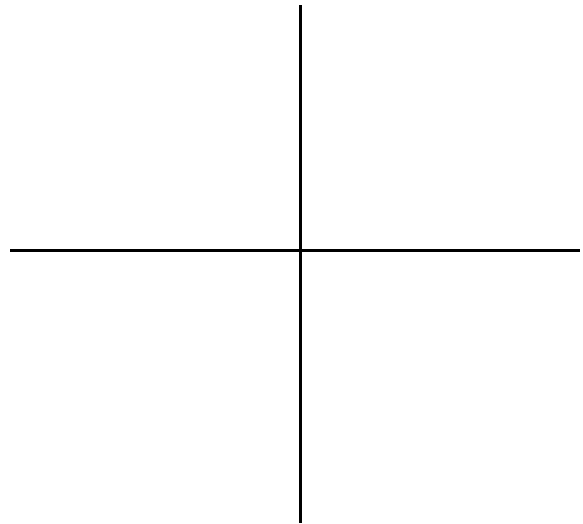
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- Grade 24) Find cube roots of  $1 + i$ . Leave answers in trig form.

- Grade 25) Graph the following. Indicate and label all critical information.

$$\frac{(y-3)^2}{9} + \frac{(x+2)^2}{4} = 1$$

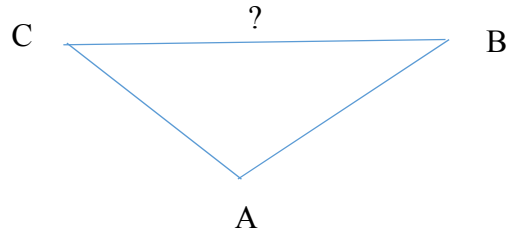
- Center: \_\_\_\_\_
- Vertices: \_\_\_\_\_
- Foci: \_\_\_\_\_



- Grade 26) An airplane is flying at a height of 2 miles above the ground. The distance along the ground from the airplane to the airport is 5 miles. What is the angle of depression from the airplane to the airport? Round to 1 decimal place.



- Grade 27) Points A & B are on opposite sides of a lunar crater. Point C is 50 m from point A. The measure of angle BAC is 112 degrees and the measure of angle ABC is 38 degrees. What is the width of the crater?



- Grade 28) Prove the following identity:  $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$

- Grade 29) Two forces of 28 N and 35 N act on objects at right angles.
- a) Find the magnitude of the resultant vector      b) Find the angle the resultant vector makes with the smaller force.