

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 $\cos\left(\frac{\pi}{2} + \theta\right)$.

- 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 $\sin^2 \theta$?

- a) $\frac{24}{5}$ b) $\frac{4}{5}$ c) $\frac{24}{25}$ d) $\frac{\sqrt{24}}{5}$ e) Not a, b, c, or d

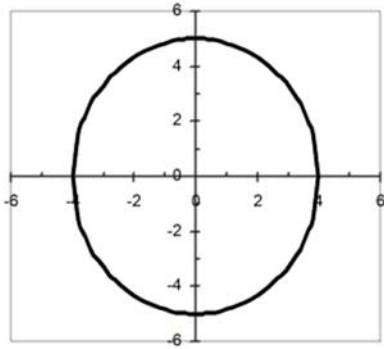
3) Find the dot product of \vec{u} and \vec{v} if $\vec{u} = \langle 2, -3 \rangle$ and $\vec{v} = \langle 1, -2 \rangle$

- a) 6
b) -1
c) $\langle 3, 3 \rangle$
d) 5
e) Not a, b, c, or d

4) Find the complement 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) 110 degrees c) 430 degrees d) 290 degrees e) Not a,b,c or d

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

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

8) What is phase shift for the graph: $y = -3 \sin(2x - 3) + 5$

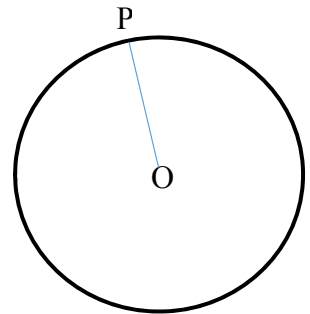
- a) 5 b) $3/2$ c) 3 d) $-3/2$ e) not a,b,c or d

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

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

10) Suppose that P is a point on a circle with a radius of 8 inches and the ray OP is rotating with angular speed 60 degrees per second.

a) Find the angular speed in radians per second



b) Find the distance travelled by P along the arc after 3 second (i.e. arc length)

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

12) If the rectangular coordinates of a point are $(4, -4)$, what are its polar coordinates (r, θ) given the following .

a) $r > 0, 0^\circ \leq \theta < 360^\circ$

b) $r < 0, 0^\circ \leq \theta < 360^\circ$

13) Write the trigonometric expression as an algebraic expression in terms of u (assuming $u > 0$).

$$\cos(\tan^{-1}u)$$

14) Perform the indicated operation:

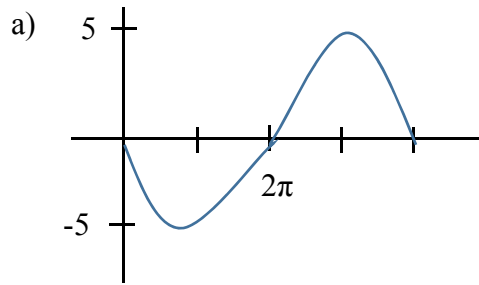
a) Factor: $2\sin^2x - 4\cos x \sin x$

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

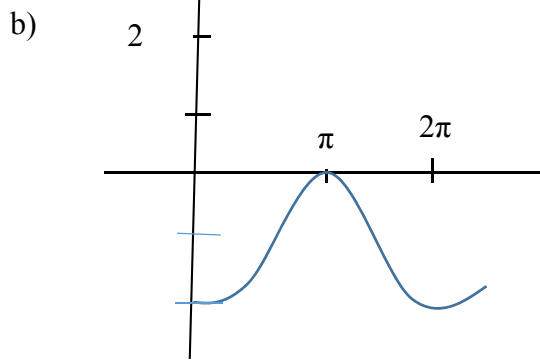
Part III. Partial credit will be given here. Show all your work. Each problem is worth 12 points.

15) Write an equation for each. (4pts each)

Answer _____



Answer _____



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

16) Given $\cos \alpha = \frac{1}{5}$, $\frac{3\pi}{2} < \alpha < 2\pi$ and $\sin \beta = \frac{1}{4}$, $0 < \beta < \frac{\pi}{2}$. Evaluate each of the following exactly (do not use any decimals!!). (12 pts)

a) $\cos(2\beta)$

b) $\sin(\alpha - \beta)$

17) Verify (prove): $\cot(x) + \tan(x) = \sec(x)\csc(x)$ Include all steps and **explanations**. (12 pts)

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

20) Solve the triangle ABC with sides $a = 4 \text{ cm}$, $b = 7 \text{ cm}$ and $c = 9 \text{ cm}$. Round all answers to the nearest tenth (one decimal place). (12 pts)

A=

B=

C=

21) Change $y^2 - 4x + x^2 + 6y = 2$ into standard form. Identify the graph as an ellipse, circle, parabola. Then graph the equation.

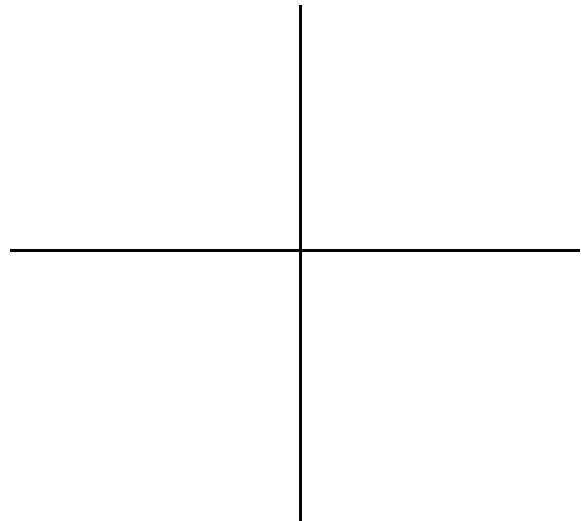
PART IV. Here are 6 problems. Do any 4, but only 4. Each is worth 10 points. Be sure to check the box for each problem to be graded.

- Grade 22) Find cube roots of $1 - i$. Leave answers in trig form.

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

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

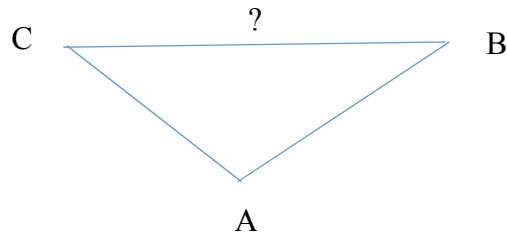
- Center: _____
- Vertices: _____
- Foci: _____



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

- Grade 24) 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? Use degrees and round to 1 decimal place.

- Grade 25) 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?



(REMDINDER: 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: $\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$

Grade

27) Two forces of 38 N and 45 N act on objects at 48 degree angles.

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