

Part I. There are 5 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 $\sin\left(\frac{\pi}{2} + \theta\right)$.

- 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

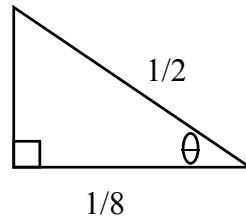
3) Find the dot product of \mathbf{u} and \mathbf{v} if $\mathbf{u} = \langle 2, -3 \rangle$ and $\mathbf{v} = \langle 1, -1 \rangle$

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

4) Find an angle coterminal to $\frac{3\pi}{8}$

- a) $\frac{4\pi}{8}$ b) $\frac{11\pi}{8}$ c) $-\frac{3\pi}{8}$ d) $\frac{19\pi}{8}$ e) Not a, b, c, or d

5) Consider the following triangle. Find $\sin\theta$.



a) 4

b) $1/4$ c) $\frac{\sqrt{15}}{8}$ d) $\frac{\sqrt{15}}{4}$

e) Not a, b, c, or d

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

a) $x = -2$ b) $x = 2$ c) $y = -3$ d) $y = -1$

e) Not a, b, c, or d

7) 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

8) Fill in the following chart using exact values.

	$30^\circ =$ _____ radians	$45^\circ =$ _____ radians	$60^\circ =$ _____ radians
Sin			
Cos			
Tan			

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

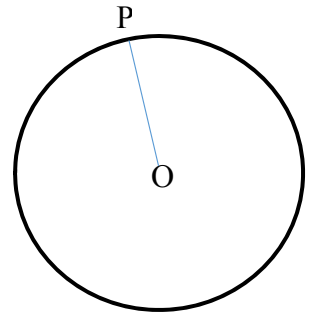
9) Given $u = \langle -2, 4 \rangle$ and vector $v = \langle -1, -1 \rangle$, find the following:

a) $|u|$

b) $2u - v$

10) Suppose that P is a point on a circle with a radius of 12 inches and the ray OP is rotating with angular speed 120 degrees per second.

a) Find the speed in radians per second



b) Find the distance travelled by P along the arc after 1 second (i.e. arc length)

11) Given $\cos x = 0.32$, 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 $(-1,1)$, what are its polar coordinates (r, θ) given the following.

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

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

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

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

14) Simplify and write answer as a single term in terms of at most one trig function.

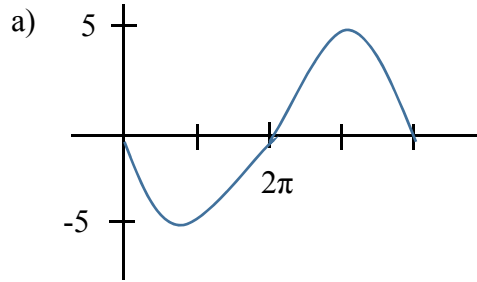
a) $\sin^3 x + \sin x \cos^2 x$

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

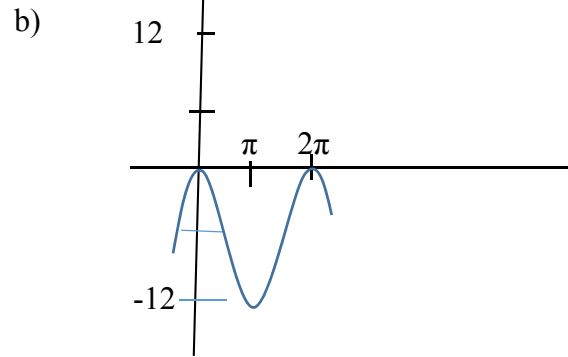
Part III. Partial credit will be given here. Show all your work. Each problem is worth 12 points.

15) Write an equation for each.

Answer _____



Answer _____



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

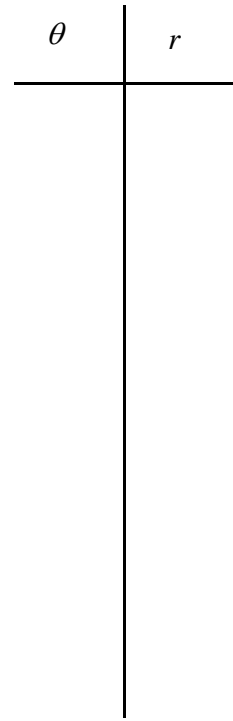
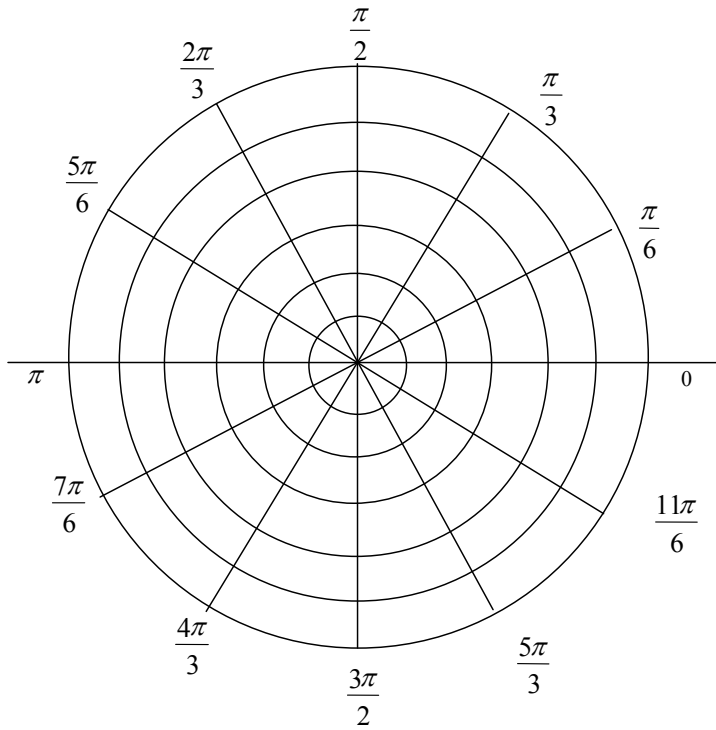
16) Given $\cos \alpha = \frac{1}{4}$, $\frac{3\pi}{2} < \alpha < 2\pi$ and $\sin \beta = \frac{1}{3}$, $0 < \beta < \frac{\pi}{2}$. Evaluate each of the following exactly (do not use any decimals!!). (12 pts)

a) $\sin(2\beta)$

b) $\cos(\alpha + \beta)$

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

18) a) Graph the polar equation $r = 3 \cos \theta$ on the axes below. (7 pts)



b) Convert the following polar form into rectangular form (no decimals!) $(3, 120^\circ)$ (5 pts)

19) Solve the triangle ABC with sides $a = 5 \text{ cm}$, $b = 7 \text{ cm}$ and $c = 10 \text{ cm}$. Round all answers to the nearest tenth (one decimal place). (12 pts)

A=

B=

C=

20) Solve the following. Give EXACT answers (no decimals)

- a) Find **all** solutions to $4\cos^2 x - 3 = 0$. (6 pts)
Express in terms of degrees.

Note: **All solutions** are the same
as **general solutions**.

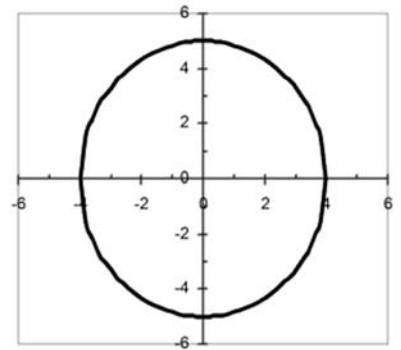
- b) $2\sin^2 x = 1 - \sin x$ on $[0, 2\pi)$ (6 pts)

(7 pts)

- 21) a) Change $y^2 - 4x + x^2 + 6y = 2$ into standard form.
Identify the graph as an ellipse, circle,
parabola, or hyperbola and state the center.

(5 points)

- b) Write the equation of
the following:



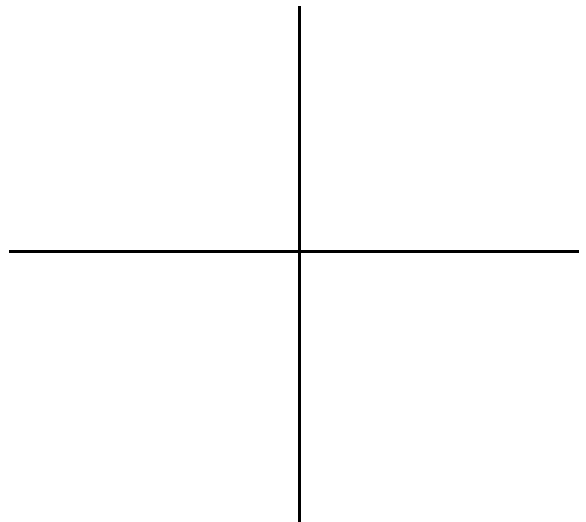
PART IV. Here are 6 problems. Do any 4, but only 4. Each is worth 10 points. Be sure to check the box for each problem to be graded. If you do not check the boxes, the first 4 will be graded.

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

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

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

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



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

Grade

24) Solve the following system of equations. Show all work:

$$x^2 + y^2 = 13$$

$$xy = 6$$

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 (distance between A and B)? Round to the nearest tenth if needed.

(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 right angles. Round to the nearest tenth.

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