

By providing my signature below I acknowledge that this is my work, and I did not get any help from anyone else:

Name (sign): \_\_\_\_\_

Name (print): \_\_\_\_\_

Student Number: \_\_\_\_\_

Instructor's Name: \_\_\_\_\_

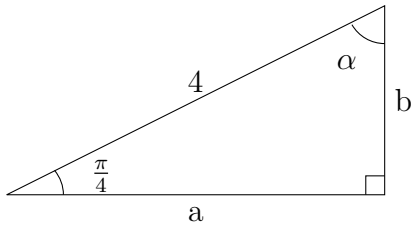
Meeting Time: \_\_\_\_\_

Problem Number	Points Possible	Points Made
1	10	
2	20	
3	20	
4	20	
5	15	
6	15	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- Please turn off your mobile phone.
- You are only allowed to use a TI-30 calculator. No other calculators are permitted. You are not permitted to share a calculator or any other materials with anyone else during the test.

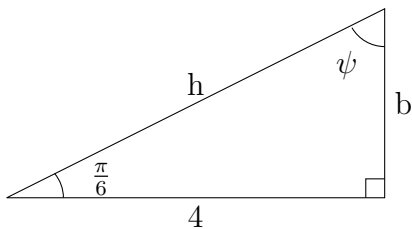
1. For each problem below determine the values of the missing quantities. All angles are in radians, and your answers for angles should be in radians. (The triangles are not drawn to scale.)

(a) [5 pts]



$a$	=
$b$	=
$\alpha$	=

(b) [5 pts]



$b$	=
$h$	=
$\psi$	=

2. Answer each of the questions below.

- (a) [10 pts] The angle  $\theta$  is in the second quadrant and  $\cos(\theta) = -0.2$ . Determine the value of  $\sin(\theta)$ .

$\sin(\theta) =$
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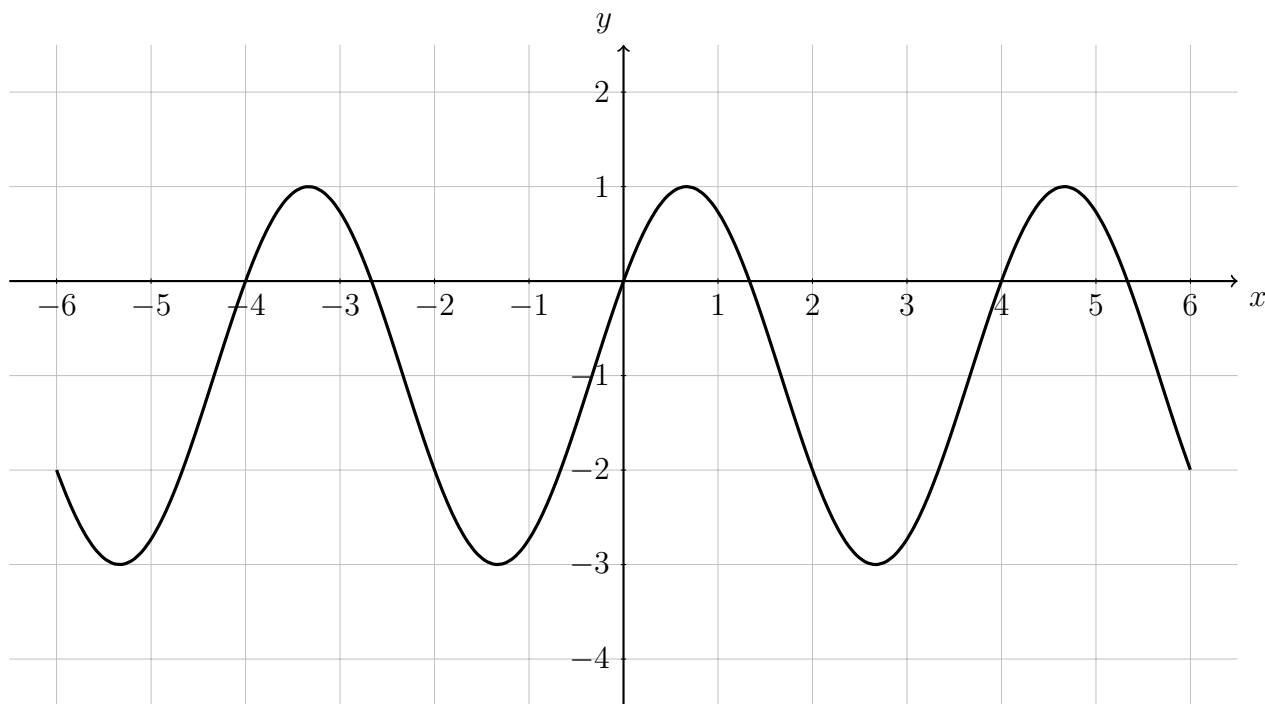
- (b) [10 pts] The angle  $\beta$  is in the third quadrant and  $\sin(\beta) = -0.8$ . Determine the value of  $\cos(\beta)$ .

$\cos(\beta) =$
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3. [20 pts] The graph of a function,

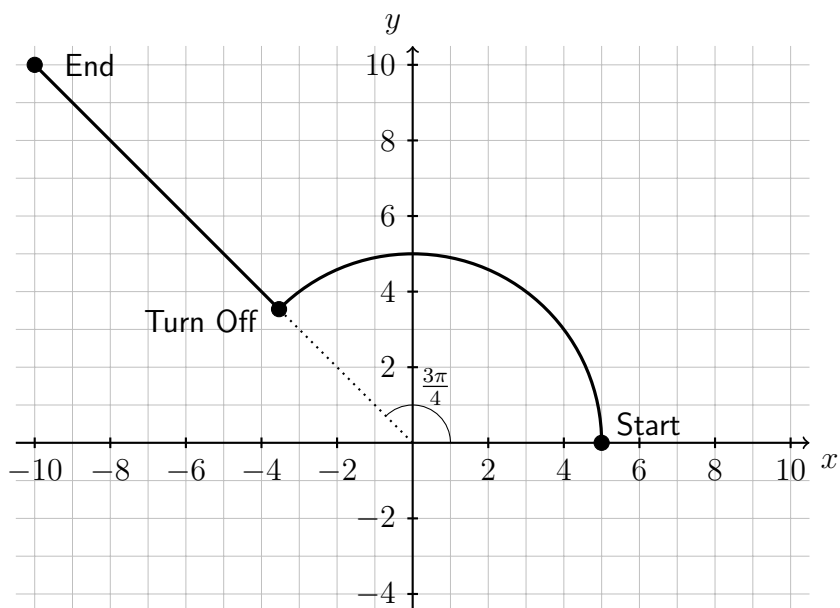
$$f(x) = A \sin(bx + c) + d,$$

is shown in the figure below. Determine the values for all of the constants,  $A$ ,  $b$ ,  $c$ , and  $d$ .



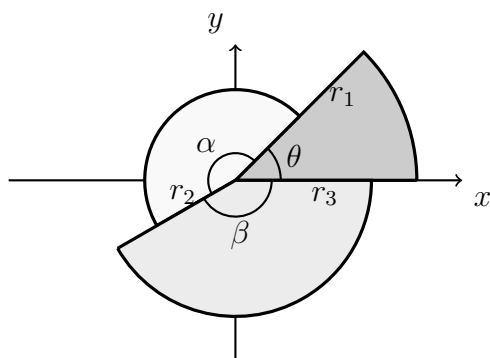
$A$	=
$b$	=
$c$	=
$d$	=

4. A person drives around a small town. The person starts at the coordinate  $P(5, 0)$  which is 5 miles due East of the center of the town. The person travels around a road that forms a circle around the center of town and travels through an angle of  $\frac{3\pi}{4}$  radians. The person then turns off the road and drives on a road straight from the center of town. The person stops at a store that is ten miles North and ten miles West of the center of town.



- (a) [10 pts] What was the person's coordinate when they turned off the arc and onto the straight road?
- (b) [10 pts] What is the total distance that the person traveled?

5. [15 pts] A researcher performed an experiment with three species of mole. For each subject she measured its mass and cardiac output. A polar plot will be constructed. The angles are based on the average masses of the three species, and the areas of each sector are based on the average cardiac output of the three species. She determines that the angle for the first species,  $\theta$ , should be 15% of the circle, and the angle for the second species,  $\alpha$ , should be 40% of the circle. She also determines that the area of the sector for the first species should be  $1 \text{ m}^2$ , the area of the sector for the second species should be  $2 \text{ m}^2$ , and the area of the sector for the third species should be  $3 \text{ m}^2$ . Determine the values of the three angles and the three radii.



6. [15 pts] Prince Henry stands on the balcony of his castle that faces the sea. The base of the castle is 100m West of the beach, and the balcony is 30m above sea level. The Prince's true love, the commoner Matilda, is cleaning fish on a ship that is 200m directly East of the beach in a direct line East of the Prince's balcony. At that instant, as the Prince gazes upon his true love's ship, what is the angle of depression of his crying eyes?

Extra space for work. If you want us to consider the work on this page you should write your name, instructor and meeting time below.

Name (print): \_\_\_\_\_ Instructor: Name (print): \_\_\_\_\_ Time: \_\_\_\_\_