Exam 2

Math 112, Winter '17, Wray

Name: _____

Don't leave anything blank.
I can sometimes give you partical credit.

Check your answers.
Also, check to see if you read the problem correctly.

Pace yourself.
Do the problems you know how to do, and save tricky ones for later.

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True/False (Decide whether each of the following statements is always true or sometimes false and then clearly mark with either T or F. [1 pt each]

1. ___ π degrees is bigger than π radians.

2. ___ All of the solutions to $\tan(\theta) = 5$ are of the form $\arctan(5) + 2\pi n$, for integers n.

3. ___ An angle of $\pi/6$ subtends an arc length of π on a circle of radius 6.

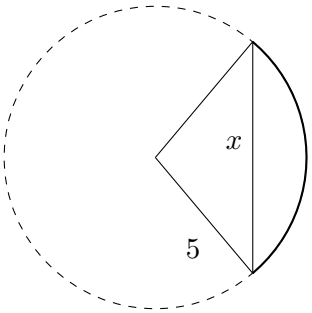
4. ___ There is an angle $\frac{\pi}{2} < \theta < \frac{3\pi}{2}$ where $\cos(\theta) > 0$.

Short Answer. Give a short explanation for each of the following questions. Use complete sentences. [3 pts each]

5. What is the value of $\arccos(\cos(240°))$? Explain using the definition of arccos.

6. Is $\cos(\theta)$ a sinusoidal function? Explain.

7. [6 pts] Find the value of x in the picture below, assuming the curve is part of a circle of radius 5. The length of the arc is 9 units.



8. [4 pts] A carpenter is tasked with cutting a triangle out of wood with dimensions $a = 10$ cm, $b = 8$ cm, $B = 50^\circ$ (angle B is opposite the side of length b). Determine the other side and angles of the triangle.

9. [6 pts] In class we talked about a satellite in geosynchronous orbit, and we described formulas for the x and y-coordinates as functions of time t in hours. For the x-coordinate we found that

$$x(t) = 26,000 \cos\left(\frac{\pi}{12}t\right).$$

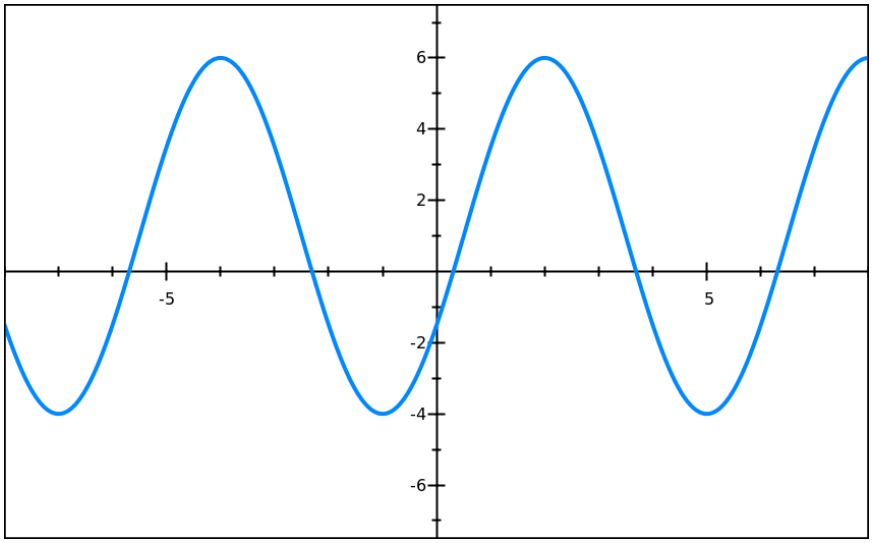
(a) What are the amplitude, midline, and period of this sinusoidal function?

(b) The satellite runs on a solar battery and recharges while it is in the Sun. Suppose the Sun rises for the satellite when $x(t) = 5,200$. Find all times t for which the satellite has a sunrise.

10. [4 pts] A line makes a 135° angle with the positive horizontal x-axis, and goes through the point $(-2, 1)$. Find the equation of the line.

11. [5 pts] The same ship that left for Tokyo from Seattle traveled 50 miles north out of the Puget Sound, then went directly west for 200 miles, and then turned southwest and traveled another 30 miles. What is the straight line distance from the ship to Seattle? (Southwest means exactly 45° south of west.)

12. [5 pts] Write down an equation for the function shown below.



Extra Credit! *Prove* the Law of Cosines. (Prove means to fully justify the formula, not just verify it in a special case.)

This page is for scratch work.

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