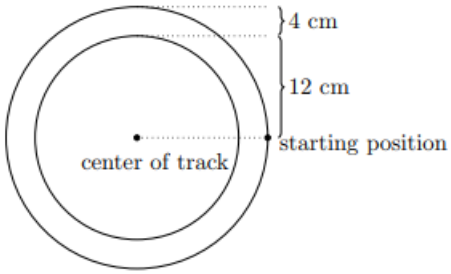
Math 105, Section 052 - Quiz 7 **Name:** _____
Date: 3/15/18

Write legibly, show work and indicate your final answers. No books, notes, etc. are permitted. This is double sided. Good luck!

1. (8 *points*) Gretchken has made a circular running track to test the metabolism of ants and termites receiving doses of Chemical Y. The track has an inner radius of 12 cm and a thickness of 4 cm as depicted below. **Please leave your answers in exact form for all parts of this problem.**



   (a) (4 *points*) First, an ant runs counterclockwise following the *outer* edge of the track. If the ant runs at a constant speed of 4.8cm/second, what is the total angular distance (in radians) that it covers in 5 minutes.

   The ant covers _____ radians in 5 minutes.

   (b) Next, a termite runs counterclockwise following the *inner* edge of the track for a total angular distance of $\frac{27\pi}{5}$ radians. How many times does it pass its start position? What is the total angular distance that it covers on its last, incomplete lap.

   The termite passes the starting point _____ times.

   It covers _____ radians after passing the starting point for the last time.

2. (10 *points*) For each of the questions below, circle **all** correct answers. You do not need to show your work for this problem. Make sure your answers are clear.

   (a) The function $f(x) = \sin(x - \frac{\pi}{2})$ is

   equal to $\cos(x)$ an even function an odd function

   neither even nor odd none of the above

   (b) Suppose θ is an angle between 0 and 90 degrees. If $v = \sin(\theta)$, then $cos(180° + \theta)$ is equal to

   v $-v$ $\sqrt{1-v^2}$ $-\sqrt{1-v^2}$ none of the above

   (c) Suppose a function $A(x)$ has a vertical asymptote of $x = 5$. The function $B(x) = 3A(3x - 6) + 1$ has a vertical asymptote of

   $x = -1/3$ $x = 13/3$ $x = 15$ $x = 23/3$ none of the above

   (d) When an ant is given Chemical Y, it grows to any given mass in half the time it takes for a regular ant to reach that mass. If $A(t)$ is the mass of a regular ant t weeks after it's born, and $B(t)$ is the mass of an ant given Chemical Y, t weeks after it's born, which of the following equalities are true?

   $A(t) = 2B(t)$ $2A(t) = B(t)$ $A(t) = B(2t)$

   $A(2t) = B(t)$ none of the above

   (e) Let $A > 1$ be a positive number. For which of the following intervals is the function $C(t) = Acos(t + 1)$ concave down for the entire interval?

   $[-1, 0]$ $[0, 1]$ $[\frac{3\pi}{2} - 1, \frac{5\pi}{2} - 1]$ $[\frac{3\pi}{2} + 1, \frac{5\pi}{2} + 1]$ none of the above