

**Math 115 Section 03 (Barsamian) Midterm 2**

Ohio University, Friday November 12, 2004

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

Attendance:  $\frac{\quad}{48}$  Quizzes:  $\frac{\quad}{200}$  Exams:  $\frac{\quad}{400}$  Course:  $\frac{\quad}{648} =$  % =

Problem	1	2	3	4	5	6	7	Total
Your score								
Possible	20	20	40	40	30	10	40	200

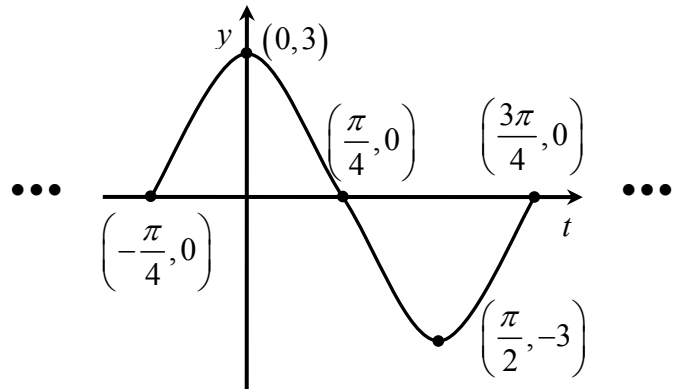
**Calculators are not allowed on this exam.**

1 (20 points) (a) Find all values of  $t$  in the interval  $[0, 2\pi]$  that satisfy the equation  $\sin(t) = -\frac{1}{2}$ . (Draw a picture that illustrates how you got your answer.)

(b) Find all values of  $t$  in the interval  $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$  that satisfy the equation  $\sin(t) = -\frac{1}{2}$ . (Draw a picture that illustrates how you got your answer.)

(c)  $\arcsin\left(-\frac{1}{2}\right) =$

2 (20 points) (a) Find a cosine function whose graph would look like the one shown to the right. (The actual graph extends forever to in the positive and negative  $t$  directions.) Explain your answer.



(b) Find a sine function whose graph would look like the one above. Explain your answer.

3] (40 points) The goal of this problem is to produce a graph of  $t = \arctan(2r - 1)$  by using transformations of graphs.

(a) Graph  $r = \text{Tan}(t)$ . (This is the “Capital” tangent function, the one with the restricted domain.) Label all important points and asymptotes.

(b) Graph  $t = \arctan(r)$ . (Remember that the “arctan” function is the inverse function for “Tan”. So, you can obtain this graph by flipping the first graph in a certain way.) Label all important points and asymptotes.

(c) Graph  $t = \arctan(r - 1)$ . Label all important points and asymptotes.

(d) Graph  $t = \arctan(2r - 1)$ .

4 (40 points) The goal of this problem is to produce a graph of  $x = 2 \log_5(y) - 2$  by using transformations of graphs.

(a) Graph  $y = 5^{(x)}$ . Label all important points and asymptotes.

(b) Graph  $x = \log_5(y)$ . (Remember that the " $\log_5(\ )$ ." function is the inverse function for " $5^{(\ )}$ ". So, you can obtain this graph by flipping the first graph in a certain way.) Label all important points and asymptotes.

(c) Graph  $x = 2 \log_5(y)$ . Label all important points and asymptotes.

(d) Graph  $x = 2 \log_5(y) - 2$ . Label all important points and asymptotes.

5 (30 points) The radioactive isotope thorium 234 has a half-life of approximately 578 hours.

(a) If a sample has an initial mass of 50 milligrams, find an expression for the mass after  $t$  hours.

(b) How much will remain after 100 hours?

(c) When will the initial mass decay to 10 milligrams?

6 (10 Points) Sketch an ellipse that has  $x$ -intercepts at  $(5, 0)$  and  $(-5, 0)$ , and has  $y$ -intercepts at  $(0, 4)$  and  $(0, -4)$ . Find the coordinates of the foci for this ellipse, and put them on the graph, as well.

7 (40 points) The goal for this problem is to give an equation for a hyperbola that foci at  $(0, 5)$  and  $(0, -5)$ , and vertices at  $(0, 4)$  and  $(0, -4)$ , and then to sketch it.

(a) For this problem,  $c = 5$  and  $a = 4$ . What is  $b$ ? Explain.

(b) What is the equation that describes the hyperbola? Explain.

(c) What are the equations that describe the asymptotes? Explain.

(d) Sketch the hyperbola, showing the important points and the asymptotes.