

Name: \_\_\_\_\_

**Math 2250 Exam #3**  
November 18, 2011

**Instructions:** You are welcome to use one sheet of notes, but no other references or tools are allowed (no textbooks, no calculators, etc.). This is a 50 minute exam; you may start working at 1:25 PM and must stop at 2:15 PM. To receive full credit for a correct answer you must demonstrate how you arrived at that answer. To receive partial credit for an incorrect answer your work must be clearly explained.

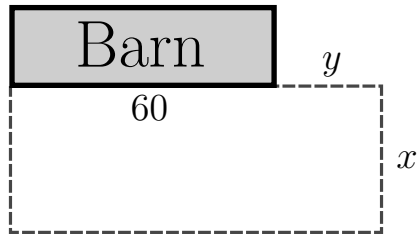
1. The function  $g(x) = x^3 - 2x^2 - 4x + 9$  has no absolute minimum, but what is the local minimum value of  $g(x)$ ?

2. Evaluate the limit

$$\lim_{x \rightarrow 0^+} \sin(x) \tan(x + \pi/2).$$

3. Let  $f(x) = e^{-2x^2}$ . Sketch a graph of  $f(x)$ . Be sure to label any absolute maxima or minima and any inflection points. Make sure your sketch is good enough that it's clear where the function is concave up and where it is concave down.

4. A farmer plans to construct a pen next to his barn, using all of the barn as part of one side of the pen. If the barn is 60 feet long and the farmer has 300 feet of fencing material, find the dimensions of the pen with the largest area that the farmer can build. Note: There is no fence along the barn wall.



5. A certain bacterial culture starts with a mass of 10 milligrams. If the rate of increase of the mass (in mg/hour) is described by the function  $\frac{1}{t+1} + \frac{1}{\sqrt{t+4}}$ , what is the mass of the culture after  $t$  hours?  
(*Note: finding a common denominator is probably going to lead you astray.*)