Problem Set #6

Due Friday, October 25, 2024 @ 12:30 pm
Submit as single pdf file to Canvas

Remember that you need to explain and show the steps in your answers!
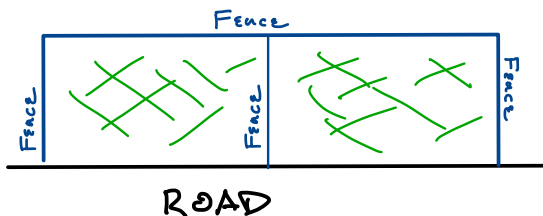
1. Evaluate the following limits.

   (a) $\displaystyle \lim_{x \to 0} \frac{\sin(3x)}{7x}$

   (b) $\displaystyle \lim_{x \to \infty} \frac{\ln(x)}{\sqrt{x}}$

   (c) $\displaystyle \lim_{x \to 0} \frac{\cos(x)}{x - 1}$

2. A city is planning to build a park along a major road. The park is to be rectangular, but broken into two smaller rectangles, each of the same size. It will be fenced off on on the three sides that are not adjacent to the road, and the city has 500m total of fencing to use.

   (a) What is the largest possible area for the park?
   (b) What are the dimensions for the park that maximize the area?
   (c) Does your answer change if the lengths of fence perpendicular to the road must be at least 100m long?

3. The strength S of a wooden beam is directly proportional to its cross sectional width w and the square of its height h. That is, $S = kwh^2$ for some constant k.
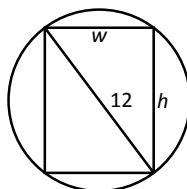
   Given a circular log with diameter of 12 inches, what sized beam can be cut from the log with maximum strength?   *Reference: APEX Calculus, Version 4.0, Exercise 4.3.12*