1. **(7 points)** Find the following features of the function $f(x) = (2x-3)e^{-x}$, labeling which is which: the intervals over which it is increasing, the intervals over which it is decreasing, the locations and types of local extrema, the intervals over which it is concave up, the intervals over which it is concave down, and the points of inflection.

2. **(7 points)** You are placing a fence around all four sides of a farmyard, as well as a fence parallel to the front fence running down the middle. You have 600 feet of fencing. What are the dimensions of the yard of largest area you can design?

3. **(6 points)** Evaluate the following limits, or demonstrate that they do not exist:

   (a) **(2 points)** $\lim_{x\to\infty} \frac{x \ln x}{x^2+3}$.

   (b) **(2 points)** $\lim_{u\to 0} \frac{e^u - u - 1}{u^2}$.

   (c) **(2 points)** $\lim_{\theta\to 0} (\theta^2 - 3\theta) \csc\theta$.

4. **(2 point bonus)** If $f(x)$ is a differentiable function such that $f(0) = 3$, $f(2) = 5$, and $f(3) = 4$, which values can you be certain are achieved by $f'(x)$ for some x?