Warm-up Problems

1. Our method for finding max/mins can be summed up as follows:
   
   I. Find all critical points
   II. Find all end points
   III. Plug everything into function and see which have largest and smallest y-values.

   (a) List the situations that this method works on.
   **Solution:** $f$ must be continuous. The method works, but is not useful if $f$ is not differentiable. There must be endpoints—the domain must be a closed interval.

   (b) List the situations that this method fails on.
   **Solution:** The main issue will be domains that are not closed intervals (such as the entire real line).

2. A car drives 100 miles in one hour. Is it possible for the car to make this trip without ever actually driving at 100 mph?
   Why or why not?

3. A car drives 100 miles in one hour. Is it possible for the car to make this trip without ever actually driving at 101 mph or 99 mph?
   Why or why not?

Lecture Problems

4. For each of the functions and intervals, find an $x$-value, $c$, such that $f'(c) = \frac{f(b)-f(a)}{b-a}$.

   (a) $f(x) = x^2 - x$ on $[1, 5]$.
   **Solution:** $c = 3$

   (b) $f(x) = \frac{x+1}{x}$ on $[\frac{1}{2}, 2]$
   **Solution:** $c = 1$

   (c) $f(x) = x^3 + 2x^2 - x$ on $[-1, 2]$
   **Solution:** $c = \left(-4 + \sqrt{76}\right)/6$