1. Last time we saw that as a consequence of the Mean Value Theorem, for a differentiable function $f(x)$:

   if $f'(x) > 0$ then the functions is ...

   if $f'(x) < 0$ then the functions is ...

   Based on this observation, we can formulate the **First Derivative Test** (p. 239 in Thomas):
   If c is a critical point of a differentiable function and :

   - if $f'(x)$ changes from negative to positive at c, then c is
   - if $f'(x)$ changes from positive to negative at c, then c is
   - if $f'(x)$ does not change sign at c, then c is

2. Let us see an application of the First Derivative Test

   (a) Consider the function $f(x) = x^3 - 5x^2 + 8x - 4$.

      i. What are the critical points?

      ii. On what intervals is $f(x)$ increasing or decreasing?

      iii. What are the local maxima and minima of $f(x)$ (if they exist)? Give their coordinates.

iv. What are the global maxima and minima of $f(x)$ (if they exist)? Give their coordinates.

(b) Same questions but for $f(x)$ defined on the interval $[-3, 3]$.
What changes and what remains the same?