**Math 180 / David Dumas / Fall 2014**

# Correction to example from Lecture 25 (Oct 22)

**Problem:** Suppose $f(x)$ is a function satisfying

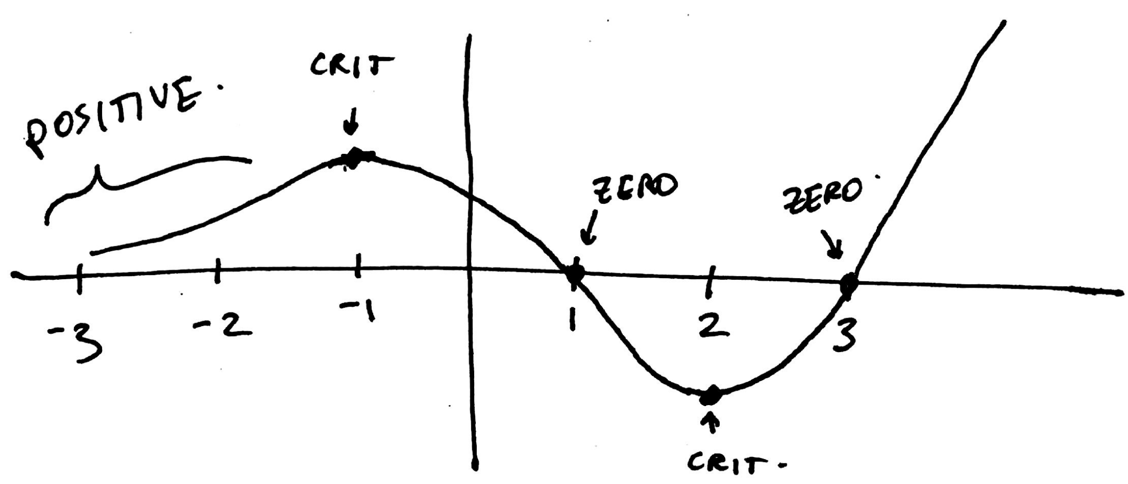
- $f(0) = 1$
- $f$ is increasing on $(-\infty, 1)$ and $(3, \infty)$
- $f$ has a local maximum at $x = 1$
- $f$ has a local minimum at $x = 3$
- $f$ is concave up on $(-\infty, -1)$ and $(2, \infty)$

Let $g(x) = f'(x)$. Sketch what the graph of $g(x)$ might look like.

**Solution:**
We translate the statements into properties of $g(x) = f'(x)$:

- $f(0) = 1$ says nothing about $g(x)$
- $g$ is positive on $(-\infty, 1)$ and $(3, \infty)$
- $g$ changes sign from positive to negative at $x = 1$
- $g$ changes sign from negative to positive at $x = 3$
- $g$ is increasing on $(-\infty, -1)$ and $(2, \infty)$

Here is a graph that has these properties (which would be an acceptable solution to the problem):




In lecture on October 22, I drew a similar figure but incorrectly had the graph of $g$ crossing the $x$-axis at some negative value of $x$. This is not consistent with the given information because $g$ is supposed to be positive for all $x < 1$.

(Note: The corresponding graph of $f(x)$ would look something like the picture below. The problem did not ask for this, but it might be helpful in understanding the image above.)