Name: _____

1. Let $f(x) = 2x^3 + 3x^2 - 12x + 1$. Find the absolute maximum and minumum of this function on the interval $[0, 2]$.

Solution: First, we compute

$$f'(x) = 6x^2 + 6x - 12 = 6(x^2 + x - 2) = 6(x + 2)(x - 1).$$

So, the critical points of $f(x)$ are $x = -2$ and $x = 1$. Only the second of these is in the interval $[0, 2]$. Plugging $x = 1$ as well as the endpoints $x = 0, 2$ into f, we get
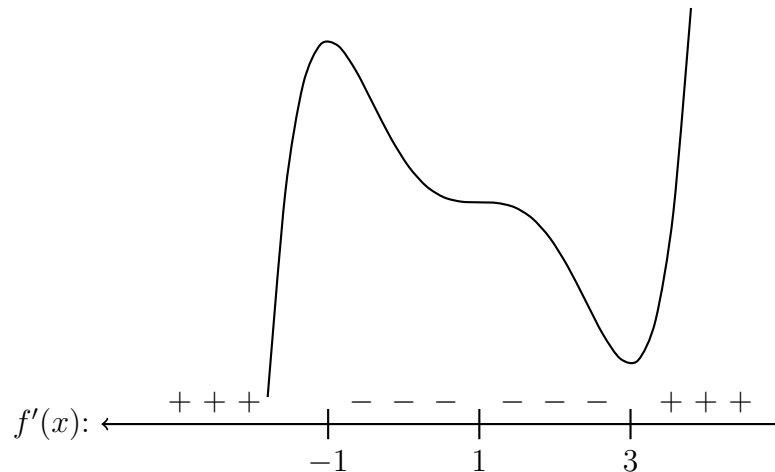
$$f(0) = 1,$$
$$f(1) = -6,$$
$$f(2) = 5.$$

We conclude that the maximum is 5 and the minimum is -6.

---

2. Suppose that the sign of $f'(x)$ is given below:

$f'(x)$: $\longleftarrow$ $+\ +\ +$ $\quad -\ -\ -\quad$ $-\ -\ -$ $\quad +\ +\ +$ $\longrightarrow$

$\qquad\qquad\qquad -1 \qquad\quad 1 \qquad\quad 3$

(a) Give all x-coordinates where $f(x)$ has a local minimum, or state that there are none.

> **Solution:** $x = 3$, since $f'(x)$ changes from negative to positive there.

(b) Give all x-coordinates where $f(x)$ has a local maximum, or state that there are none.

> **Solution:** $x = -1$, since $f'(x)$ changes from positive to negative there.

(c) Sketch the graph in the space above the sign diagrams.