Example 1. Let $f(x) = 9x^2 - x^3$.

(a) Find the critical points of $f(x)$ algebraically.

(b) Use your computer/calculator to graph $f(x)$ (show your graph). Identify each critical point as a local max/min/neither.

Example 2. Let $f(x) = 3x^4 + 4x^3 + 6$.

(a) Find the critical points of $f(x)$ algebraically.

(b) Use your calculator to plug in $x$-values to $f'(x)$ to determine if $f'(x)$ is $+$ or $-$. (Hint: there are two critical points, so you need to plug 3 values into $f'(x)$: you can pick one value to the left of all the critical points, one value in between the two critical points, and one value to the right of all of them. You pick them, and then plug them into $f'(x)$.)

(c) Conclude whether each point is a local max/min/neither.

(d) Summarize your result in a 1D#table like we did in the videos (and like the book did in example 1).

Example 3. Let $f(x) = x^4 + 4x^3$. This function has a critical point at $x = -3$. Apply the second derivative test to find out if this critical point is a local max or local min.