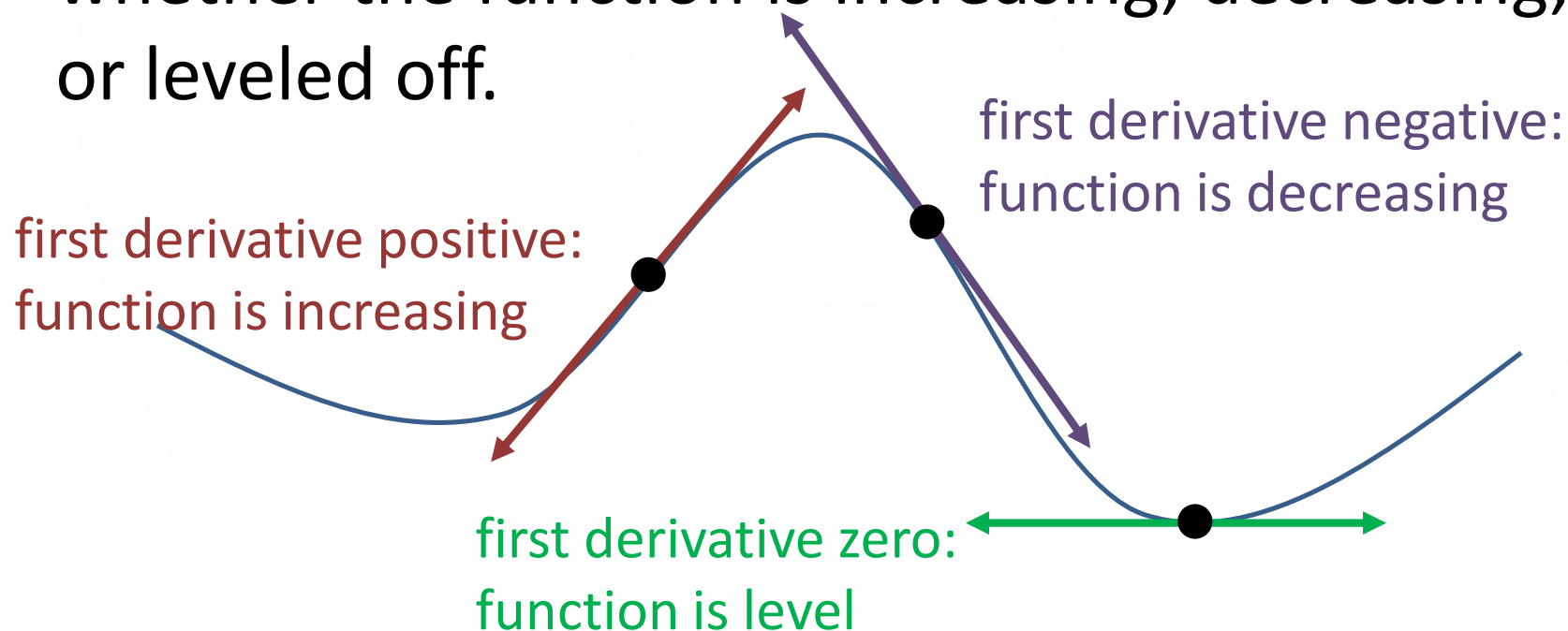


Curve Sketching with Calculus

- First derivative and slope
- Second derivative and concavity

First Derivative: Review

As you will recall, the first derivative of a function gives you the slope, which can tell you whether the function is increasing, decreasing, or leveled off.



Practice Problem 1

Given the function $y = x^4 - 3x^2 + 2x - 8$,

Report where this function is increasing, decreasing, or equal to zero.

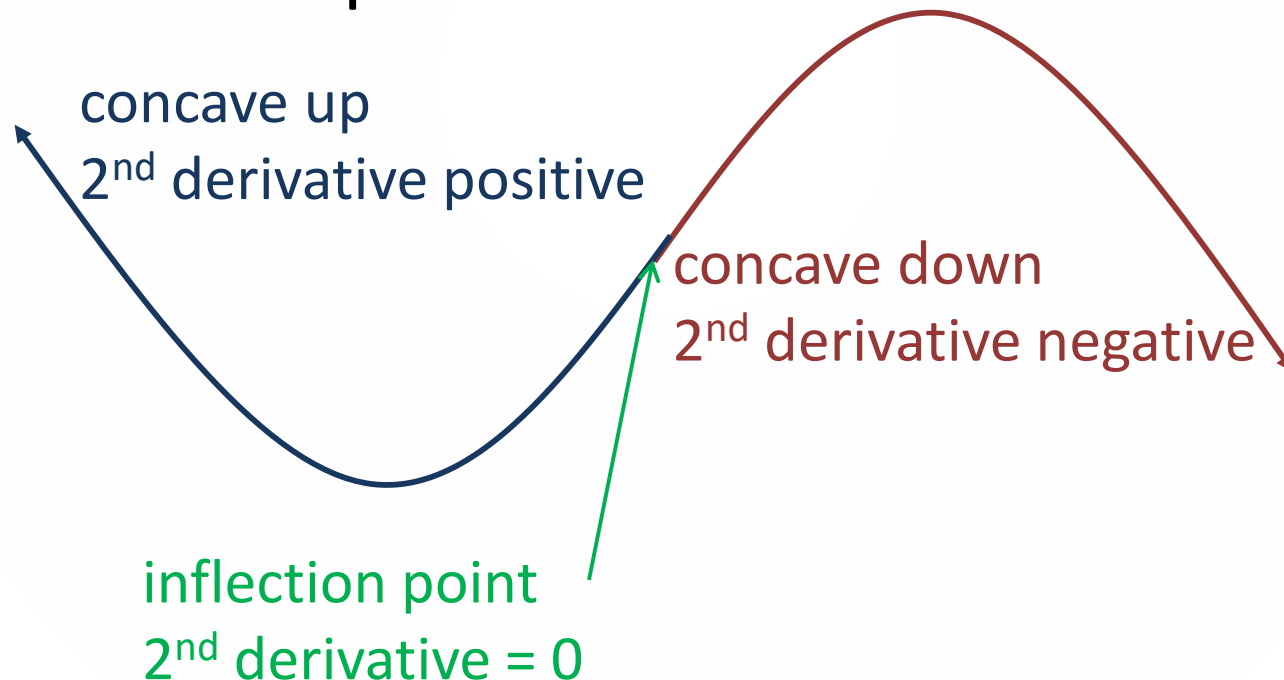
Practice Problem 2

Write a program using the Calculus package or your program for derivatives that will return, for any polynomial function, the intervals of increase and decrease.

Save and document your code!

Second Derivative: Review

As you will recall, the second derivative describes the concavity of the function, which can be either up or down:



Practice Problem 3

Modify your program from Problem 2 to report, for any polynomial function, the intervals where that function is concave up and concave down.

You do not need to save this program beyond the next practice problem.

Practice Problem 4

Consider the function

$$f(x) = x^4 - 9x^3 + 12x^2 + 25x + 12$$

on the interval $[-3, 8]$.

Find intervals of increase and decrease, critical points (including y-values), and inflection points.

Use your information to sketch an accurate graph of this function.