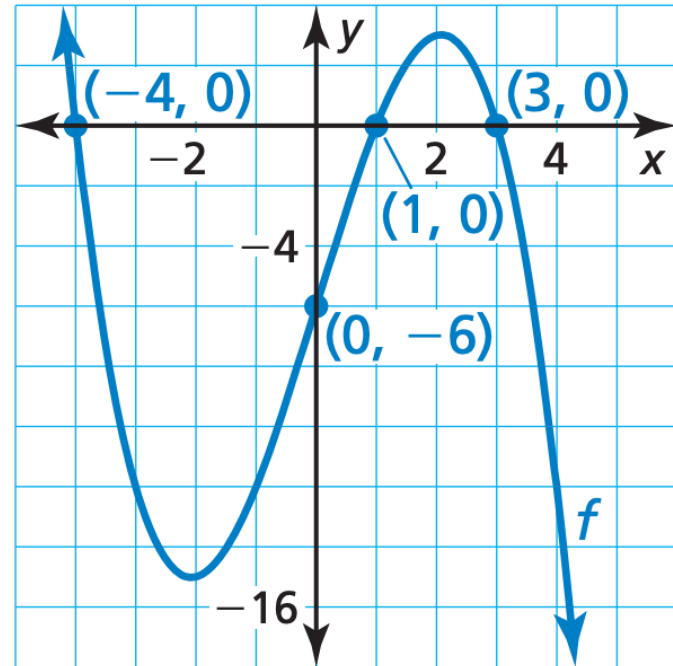# Bell Work

Use your calculator to identify the local max/min.

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

Write the cubic function whose graph is shown.

Write the cubic function given the points.

(−4, 0), (0, 10), (2, 0), (5, 0)

Write the cubic function given the points.

(−3, 0), (-1, 6), (1, 0), (2, 0)

Finite Differences

When the x-values in a data set are equally spaced, the differences of consecutive y-values are called **finite differences**. Recall from Section 2.4 that the first and second differences of $y = x^2$ are:

Equally-spaced x-values

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

first differences: -5 -3 -1 1 3 5

second differences: 2 2 2 2 2
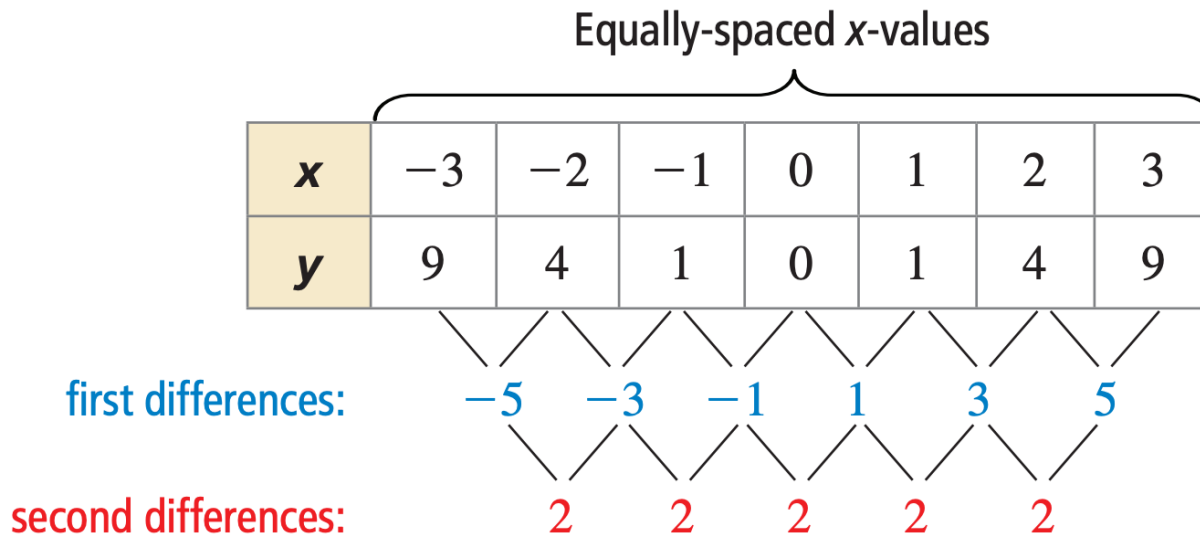
KEY IDEA

Properties of Finite Differences

1. If a polynomial function $y = f(x)$ has degree n, then the nth differences of function values for equally-spaced x-values are nonzero and constant.

2. Conversely, if the nth differences of equally-spaced data are nonzero and constant, then the data can be represented by a polynomial function of degree n.

Use finite differences to determine the degree of the polynomial function that fits the data. Then use technology to find the polynomial function.

x	1	2	3	4	5	6	7
f(x)	1	4	10	20	35	56	84

Use finite differences to determine the degree of the polynomial function that fits the data. Then use technology to find the polynomial function.

x	−3	−2	−1	0	1	2
f(x)	6	15	22	21	6	−29