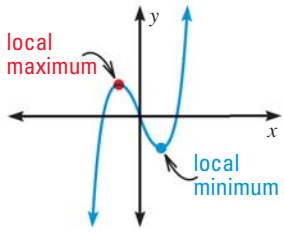
TURNING POINTS Another important characteristic of graphs of polynomial functions is that they have *turning points* corresponding to local maximum and minimum values.

- The y-coordinate of a turning point is a **local maximum** of the function if the point is higher than all nearby points.
- The y-coordinate of a turning point is a **local minimum** of the function if the point is lower than all nearby points.



KEY CONCEPT *For Your Notebook*

Turning Points of Polynomial Functions

1. The graph of every polynomial function of degree n has *at most* $n - 1$ turning points.
2. If a polynomial function has n distinct real zeros, then its graph has *exactly* $n - 1$ turning points.

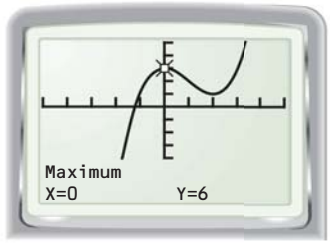
EXAMPLE 2 Find turning points

Graph the function. Identify the x-intercepts and the points where the local maximums and local minimums occur.

a. $f(x) = x^3 - 3x^2 + 6$ **b.** $g(x) = x^4 - 6x^3 + 3x^2 + 10x - 3$

Solution

a. Use a graphing calculator to graph the function.

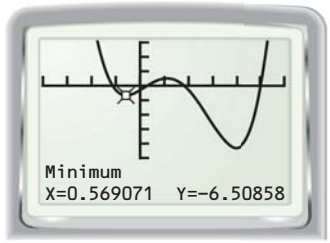


Notice that the graph of f has one x-intercept and two turning points.

You can use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points.

▶ The x-intercept of the graph is $x \approx -1.20$. The function has a local maximum at **(0, 6)** and a local minimum at **(2, 2)**.

b. Use a graphing calculator to graph the function.



Notice that the graph of g has four x-intercepts and three turning points.

You can use the graphing calculator's *zero*, *maximum*, and *minimum* features to approximate the coordinates of the points.

▶ The x-intercepts of the graph are $x \approx -1.14$, $x \approx 0.29$, $x \approx 1.82$, and $x \approx 5.03$. The function has a local maximum at **(1.11, 5.11)** and local minimums at **(−0.57, −6.51)** and **(3.96, −43.04)**.

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FIND MAXIMUMS AND MINIMUMS
For help with using the *maximum* and *minimum* features of a graphing calculator, see p. 244.