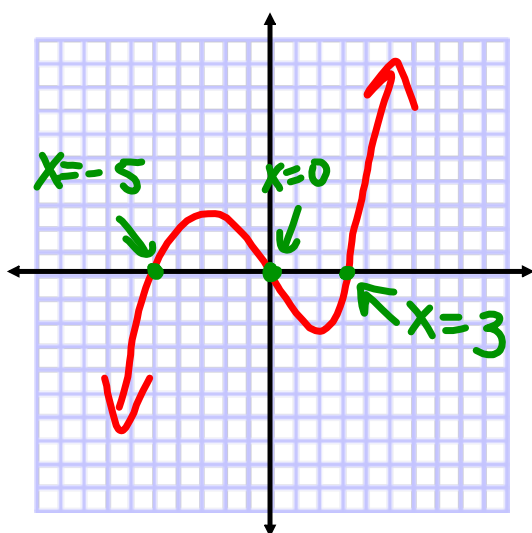


6.2 Part 2 Graphing Polynomials

What does it mean to be a zero of a polynomial?




If k is a zero of a polynomial, then:

1. $x - k$ is a factor of $P(x)$.
2. $x = k$ is a solution/root (real or imaginary) of the equation $P(x) = 0$.
3. If k is a real root, then k is an x-intercept of the graph of $P(x)$.

$$P(x) = x(x+5)(x-3)$$

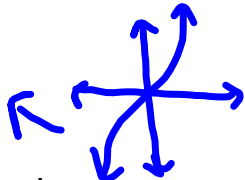
Multiplicity of a Root

The multiplicity of a root is the same as the exponent on the factor.

$$f(x) = x^2$$


What happens to the graph at $x = 0$?

If the multiplicity is even, it "bounces" off the axis.

$$f(x) = x^3$$


What happens to the graph at $x = 0$?

If the multiplicity is odd, it crosses through the axis.

Sketch the graph of the function using its intercepts.

$$f(x) = \frac{1}{6}(x+3)(x-2)^2$$

Degree: 3

End Behavior:

Odd / pos. coeff.

Zeros: -3, 2

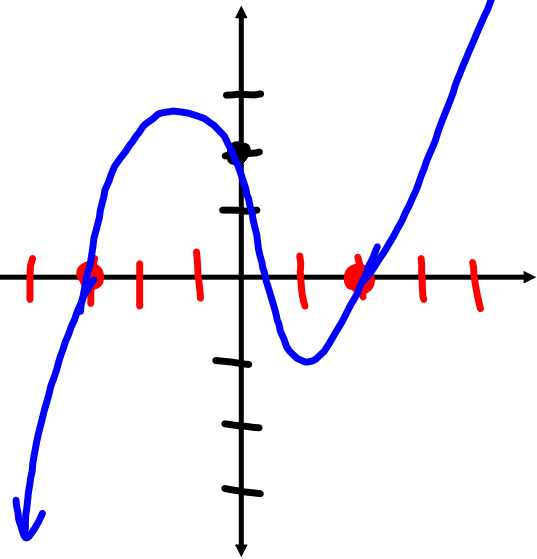
Max. # of turns: 2

y-intercept:

$$\begin{aligned} \text{Let } x=0 & \quad \frac{1}{6}(0+3)(0-2)^2 \\ & \quad \frac{1}{6}(3)(-2)^2 \\ & \quad \frac{1}{6}(3)(4) \\ & \quad \frac{1}{6}(12) = \boxed{2} \end{aligned}$$

$$\begin{aligned} x-2 &= 0 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} x+3 &= 0 \\ x &= -3 \end{aligned}$$



Sketch the graph of the function using its intercepts.

$$\begin{array}{l} x+3=0 \quad x-1=0 \\ x=-3 \quad x=1 \end{array}$$

$$\begin{array}{l} x-4=0 \\ x=4 \end{array}$$

$$f(x) = -(x+3)^2(x-1)(x-4)$$

Degree: 4

End Behavior: *Left:* as $x \rightarrow -\infty$, $f(x) \rightarrow -\infty$
Right: as $x \rightarrow \infty$, $f(x) \rightarrow -\infty$
 Even / neg. coeff.

Zeros: -3, 1, 4

Max. # of turns: 3

y-intercept:

$$\text{Let } x=0 \quad -(0+3)^2(0-1)(0-4)$$

$$-(3)^2(-1)(-4)$$

$$-(9)(4)$$

$$\boxed{-36}$$

