What's Up With the Zeros?

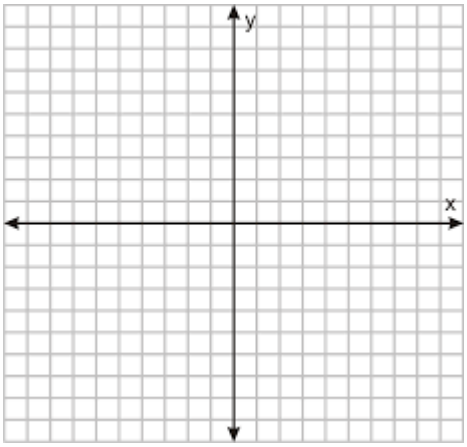
Yesterday we looked at the rate of change of polynomial functions. Today we'll look at another key feature of polynomials: their zeros. Use desmos.com to graph each of the polynomials below.

1. Graph $g(x) = (x-2)(x-2)(x+3)$ on the coordinate plane and identify the following:
   a. X-intercept(s):

   b. What is the degree of the polynomial?

   c. How are the factors related to the x-intercepts?

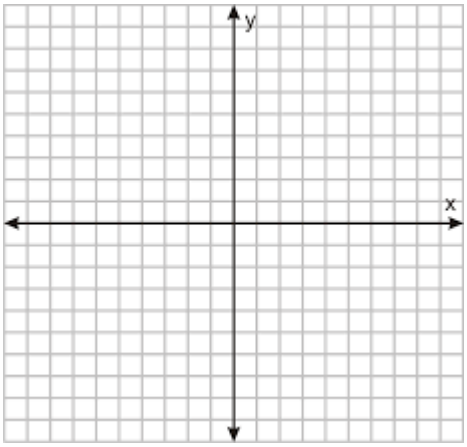
   d. What is different about the behavior of the graph at $x = 2$ and at $x = -2$? Why do you think this happens?



2. Graph $f(x) = (x-2)^3(x+4)$ on the coordinate plane and identify the following:
   a. X-intercept(s):

   b. What is the degree of the polynomial?

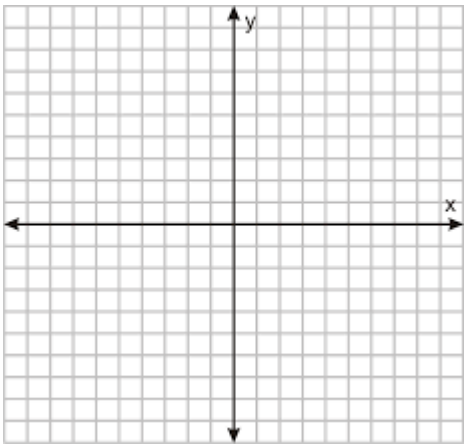
   c. What do you notice about the behavior around the x-intercepts?



3. Graph $f(x) = \frac{1}{2}(x+3)(x+1)(x^2+4)$ on the coordinate plane and identify the following:
   a. X-intercept(s):

   b. What is the degree of f?

   c. How many solutions are there to the equation $f(x) = 0$?



4. Some solutions, or zeros, can't be seen on a graph. They are imaginary. Explain why the equation $x^2 + 4 = 0$ has imaginary solutions. What are they?

5. Can a quadratic equation ever have one real and one imaginary solution? Explain why or why not.

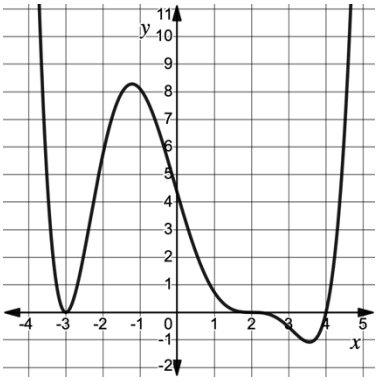
Lesson 2.2 –Zeros of Polynomial Functions

QuickNotes

Check Your Understanding

1. The graph of a 6th degree polynomial $y = g(x)$ is shown.
   a. Identify all the zeros of g and state their multiplicity.

   b. Does the equation $g(x) = 0$ have any imaginary solutions? How do you know?



2. A polynomial has zeros at $x = 4$ (with a multiplicity of 2), $x = -2$, and $x = 3i$.
   a. What is the minimum degree of the polynomial?

   b. Write an equation for the polynomial in factored form.

3. Let $f(x) = (x + 6)(x^2 + 2x + 5)$.
   a. Find all zeroes of f.

   b. Rewrite the equation for $f(x)$ in fully factored form (only linear factors).