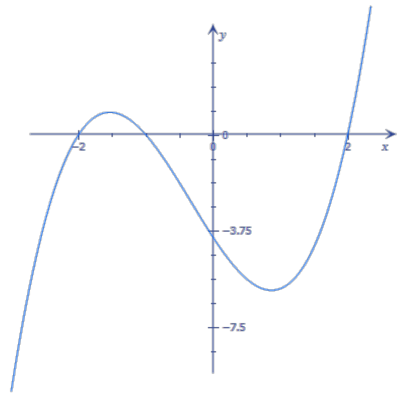
Exit Ticket Sample Solutions

Sketch a graph of the function $f(x) = x^3 + x^2 - 4x - 4$ by finding the zeros and determining the sign of the function between zeros. Explain how the structure of the equation helps guide your sketch.



$f(x) = (x+1)(x+2)(x-2)$

Zeros: $-1, -2, 2$

For $x < -2$: $f(-3) = -10$, so the graph is below the x-axis on this interval.

For $-2 < x < -1$: $f(-1.5) = 0.875$, so the graph is above the x-axis on this interval.

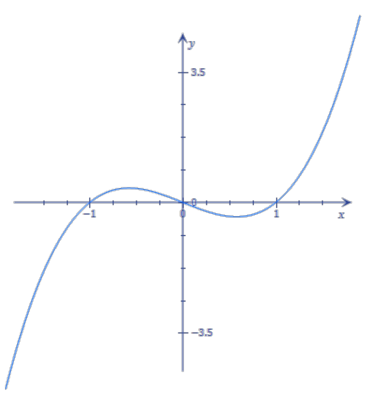
For $-1 < x < 2$: $f(0) = -4$, so the graph is below the x-axis on this interval.

For $x > 2$: $f(3) = 20$, so the graph is above the x-axis on this interval.

Homework Problem Set Solutions

1. **Sketch each of the following polynomial functions. What are the function's zeros and multiplicities? What is the end behavior of the function? Choose a point or two to get a more accurate graph.**

   A. $f(x) = x(x-1)(x+1)$



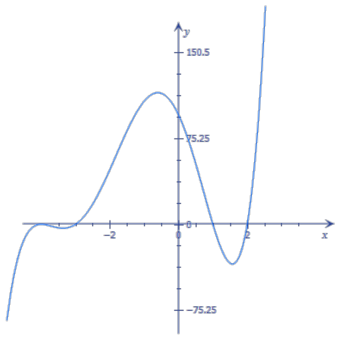
Zeros: $-1, 0, 1$

Solutions to $f(x) = 0$: $-1, 0, 1$

x-intercepts: $-1, 0, 1$

The degree is 3, which is the same as the number of x-intercepts.

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



Zeros: $\mathbf{-4, -4, -3, 1, 2}$

Solutions to $\boldsymbol{f(x) = 0}$: $\mathbf{-4, -3, 1, 2}$

$\boldsymbol{x}$***-intercepts:*** $\mathbf{-4, -3, 1, 2}$

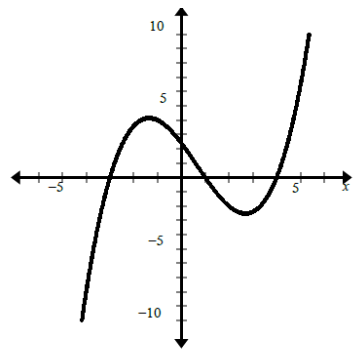
The degree is $\mathbf{5}$***, which is greater than the number of*** $\boldsymbol{x}$***-intercepts.***

2. A. What are the zeros of the polynomial shown?

-3, 1, 4

B. What type of multiplicity must each zero have? Why?

Each zero must have an odd multiplicity because each one goes through the x-axis.



3. The table below lists all the real zeros of a 5th degree polynomial function, *f*(*x*), and the multiplicity of each zero. Write two possible equations for *f*(*x*).

Zero	Multiplicity
-4	1
-1	2
2	2

Answers will vary. Two sample responses are given.

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

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

4. Graph the polynomial function $f(x) = x^5 - 8x^3 + 16x$.