

Name: \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

## Honors - Graphing (Factored) Polynomials Notes

Definition:

**Zeros:**  $x$ -intercepts, roots, solution  
(Where the graph touches the  $x$ -axis)

Find the zeros of the following factored polynomials.

1)  $y = (x - 2)(x + 1)(x + 3)$

$$x - 2 = 0$$
$$x = 2$$

$$x + 1 = 0$$
$$x = -1$$

$$x + 3 = 0$$
$$x = -3$$

2)  $y = 2x(x - 7)(x + 5)$

$$x = 7$$
$$x = -5$$
$$x = 0$$

Definitions:

**Multiple:**

a zero that repeats  
ex:  $(x - 2)^2$  or  $3x^4$

**Multiplicity:**

how many times the zero repeats

### Steps for Sketching the Graph of a (Factored) Polynomial:

1) Find the zeros.

2) Find any multiples and determine their multiplicity.

3) Determine end behavior.

- The number of zeros will help you to determine if the polynomial is even or odd.

4) Plot the zeros on the  $x$ -axis and connect them accordingly.

- Start with the arrows on the ends.

• **Very Important:**

- Odd Multiplicity - Goes "through" the zero
- Even Multiplicity - "Bounces Off" the zero

\*\*\* At this point in time we will not be concerned with the  $y$ -values of the polynomial \*\*\*

For each of the following (factored) polynomials:

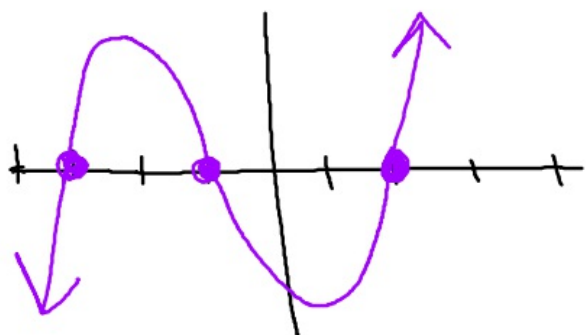
a) Find the zeros

b) State any multiples with their multiplicities. (If there are no multiples say so!)

c) Graph the polynomial

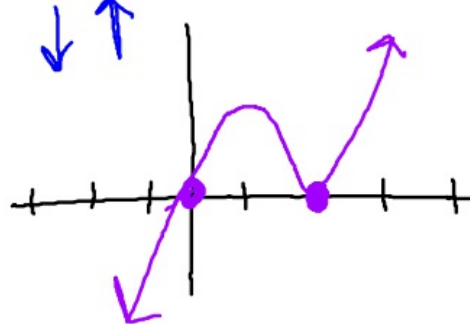
1)  $y = (x - 2)(x + 1)(x + 3)$

Zeros:  $x=2$   $x=-1$   $x=-3$   
 no multiples  
 $+0 \downarrow \uparrow$



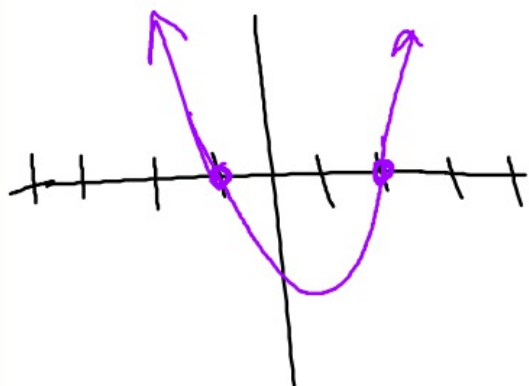
2)  $y = x(x - 2)^2$

$x=0$   $x=2$   $x=2$   
 multiple: 2 with multiplicity of 2  
 $+0 \downarrow \uparrow$



3)  $y = (x - 2)(x + 1)^3$

$x=2$   $x=-1$   $x=-1$   $x=-1$   
 multiple: -1 with a multiplicity of 3  
 $+E \uparrow \uparrow$



4)  $y = -2x^4(x + 2)(x + 4)$

$x=0$   $x=0$   $x=0$   $x=0$   
 $x=-2$   $x=-4$   
 multiple = 0 w/ multiplicity 4  
 $-E \downarrow \downarrow$

