Name: Key Hour: _____ Date: _____

Graphing (Factored) Polynomials – With Multiplicity Notes

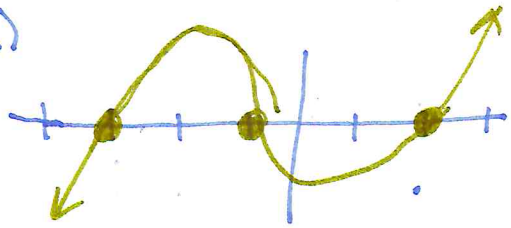
Recall from yesterday: (a) State the zeros of the polynomial (b) determine the end behavior of the polynomial (c) sketch a graph of the polynomial.

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

a) $x=2$ $x=-1$ $x=-3$

b) positive rdd ↓↑

c)

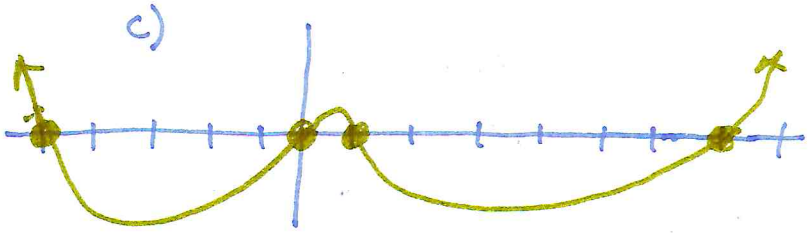


2) $y = 2x(x-7)(x+5)(x-1)$

a) $x=0$ $x=7$ $x=-5$ $x=1$

b) positive even ↑↑

c)



NEW DEFINITIONS:

Multiple: a zero that repeats more than one time

Multiplicity: how many times a zero repeats
↳ usually represented with exponents!

*****Important!*****

Graphing is almost entirely the same process as before, EXCEPT

- Zeros that have Odd multiplicity go "through" the x-axis.
- Zeros that have even multiplicity "bounce off" of the x-axis.

Find the zeros of each function. State the multiplicity of multiple zeros.

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

$x=-3$ $x=-3$ $x=-3$

-3 has multiplicity of 3

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

$x=2$ $x=2$ $x=1$

2 has multiplicity of 2

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

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

0 has multiplicity of 2

For the following polynomials:

a) Find the zeros

b) State any multiples and multiplicities

c) Determine the end behavior

d) Graph the polynomial

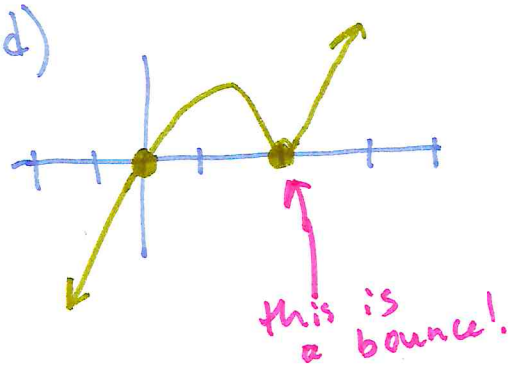
1) $y = x(x-2)^2$

a) $x=0 \quad x=2 \quad x=2$

b) 2 has multiplicity of 2 (bounce)

c) positive odd ↓ ↑

d)



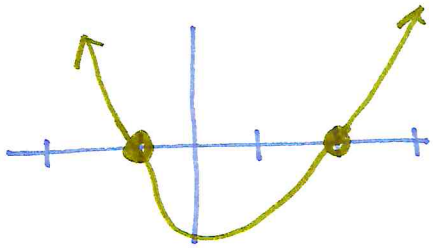
2) $y = (x-2)(x+1)^3$

a) $x=2 \quad x=-1 \quad x=-1 \quad x=-1$

b) -1 has a multiplicity of 3 (through)

c) even positive ↑ ↑

d)



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

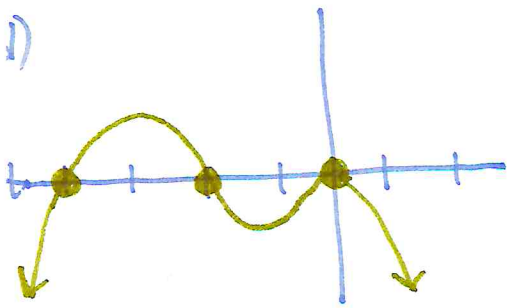
a) $x=0 \quad x=0 \quad x=0 \quad x=0$

$x=-2 \quad x=-4$

b) 0 has a multiplicity of 4 (bounce)

c) negative even ↓ ↓

d)



4) $y = -x(x-2)^3(x+3)^2(x-5)$

a) $x=0 \quad x=+2 \quad x=+2 \quad x=+2$

$x=-3 \quad x=-3 \quad x=5$

b) +2 has a multiplicity of 3 (goes through)

-3 has a multiplicity of 2 (bounce)

c) negative odd ↑ ↓

d)