

5.2 Polynomials, Linear Factors and Zeros

- a. I can analyze the factored form of a polynomial and determine number of solutions and multiplicity.
- b. I can write a polynomial function given its real zeros.

| | | |
|----------|--------------|-----|
| p. 78-79 | Multiplicity | 5.2 |
|----------|--------------|-----|

Warm-up:

p.78

Glue worksheet onto p. 78 (very top of page)

What are roots?

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~~X: intercepts~~ Solutions

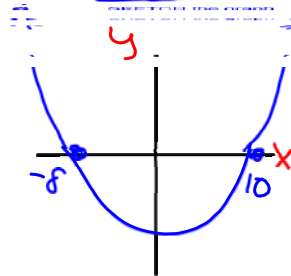
Given the Factored Form, determine the Roots/Zeros:

1.) $g(x) = (x - 10)(x + 8) = 0$

$x - 10 = 0$
 $x + 8 = 0$

Roots: 10, -8

Degree 2 Pos/Neg



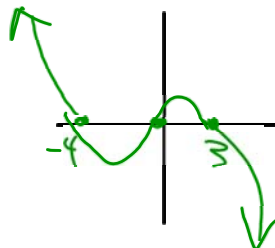
2.) $f(x) = -3x(x + 4)(x - 3) = 0$

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

SKETCH the graph

Roots: -4, 3

Degree 3 Pos/Neg



p.79

Multiplicity

Multiplicity is: ~~the~~ number of times a root appears

If a root/factor has an EVEN multiplicity: graph will bounce x-axis

If a root/factor has an ODD multiplicity: graph crosses x-axis

$(x+3)(x+3)$

For example: For the polynomial function $f(x) = (x-2)(x+3)^2$

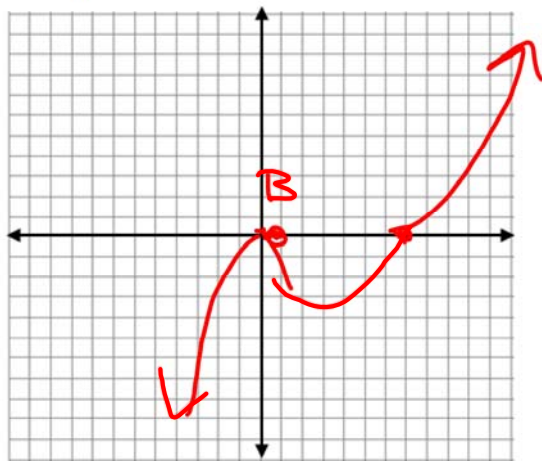
The factor $(x-2)$ is listed 1 time(s) so it has a multiplicity of 1. EVEN/ODD?
 Therefore, at the root 2 the graph will CROSS x-axis.

The factor $(x+3)$ is listed 2 time(s) so it has a multiplicity of 2. EVEN/ODD?
 Therefore, at the root -3 the graph will bounce x-axis.

$f(x) = (x-7)(x-1)^2$

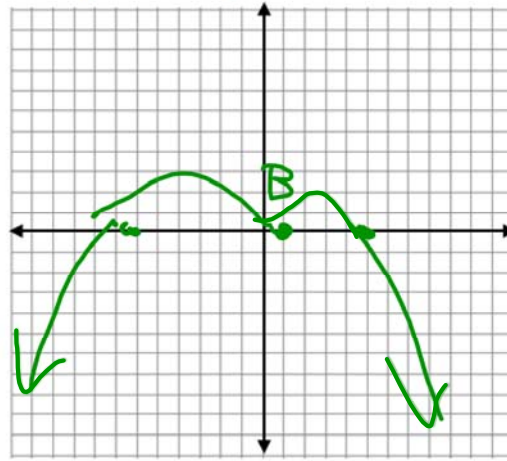
p.78

1. Roots: 7, 1 (multiplicity of 2)
 Leading Coefficient: Positive
 Degree? 3



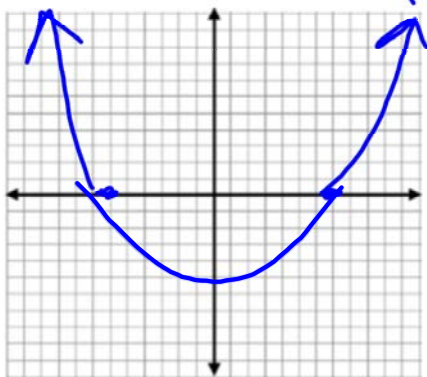
End Behavior: $x \rightarrow +\infty \quad f(x) \rightarrow +\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$

2. Roots: -6, 1 (multiplicity of 2), 5
 Leading Coefficient: Negative
 Degree? 4

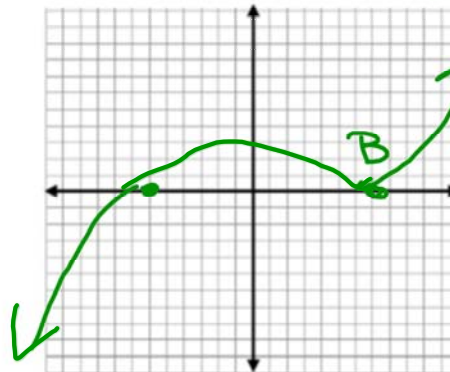


End Behavior: $x \rightarrow +\infty \quad f(x) \rightarrow -\infty$
 $x \rightarrow -\infty \quad f(x) \rightarrow -\infty$

Roots: $-6, 7$ \Rightarrow ± 2
 $y = (x + 6)(x - 7)$ POS.



Roots: $-6, 7$ (mult. \Rightarrow) \Rightarrow p.79
 $y = (x + 6)(x - 7)^2$ Deg. 3 POS.



Graph the polynomials from Factored Form

1. Determine what the roots/zeros are
2. Identify the multiplicity of each root
3. Use the leading coefficient and degree to graph

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Homework: Worksheet (on next pages)

Algebra 2
Polynomials - Review Target 1-3

Name _____

Find the zeros, determine the degree, leading coefficient, graph and then determine the end behavior.

1. $f(x) = (x+4)(x-4)(x-8)$

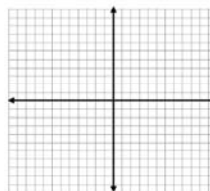
Zeros:

Degree:

Even/Odd:

Leading Coefficient:

End Behavior: $x \rightarrow +\infty$ $f(x) \rightarrow$
 $x \rightarrow -\infty$ $f(x) \rightarrow$



2. $f(x) = (x+8)(x+3)(x-5)^2$

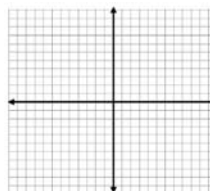
Zeros:

Degree:

Even/Odd:

Leading Coefficient:

End Behavior: $x \rightarrow +\infty$ $f(x) \rightarrow$
 $x \rightarrow -\infty$ $f(x) \rightarrow$



3. $f(x) = -x(x-1)(x+4)^2(x+7)$

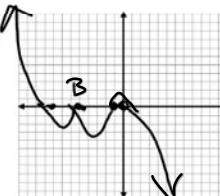
Zeros: 0, 1, -4 (mult. 2), -7

Degree: 5

Even/Odd: Odd

Leading Coefficient: neg.

End Behavior: $x \rightarrow +\infty$ $f(x) \rightarrow -\infty$
 $x \rightarrow -\infty$ $f(x) \rightarrow +\infty$



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

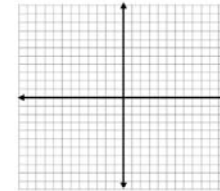
Zeros:

Degree:

Even/Odd:

Leading Coefficient:

End Behavior: $x \rightarrow +\infty$ $f(x) \rightarrow$
 $x \rightarrow -\infty$ $f(x) \rightarrow$



5. $f(x) = x(x-9)^2(x+5)^4$

Zeros:

Degree:

Even/Odd:

Leading Coefficient:

End Behavior: $x \rightarrow +\infty$ $f(x) \rightarrow$
 $x \rightarrow -\infty$ $f(x) \rightarrow$

