Zero: The number "K" is said to be a zero of a polynomial if $f(K)=0$.

- "K" is often referred to the root, solution or x-intercept

Factoring Review: Find all solutions of $f(x)=5x^3-3x^2-5x+3$

$$f(x) = \underbrace{5x^3-3x^2}\underbrace{-5x+3}$$

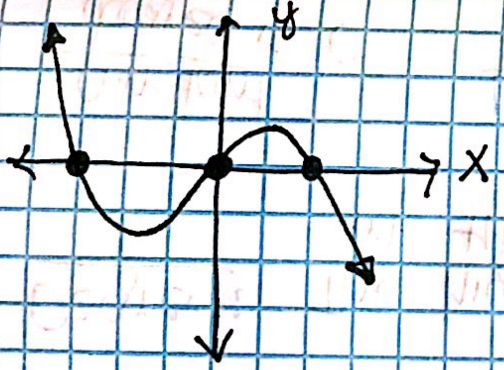
$$x^2(5x-3)-1(5x-3)$$

$$(5x-3)(x^2-1)$$

$$(5x-3)(x+1)(x-1)$$ Factored Form

Zeros:
$x=1$
$x=-1$
$x=\frac{3}{5}$

Example 1

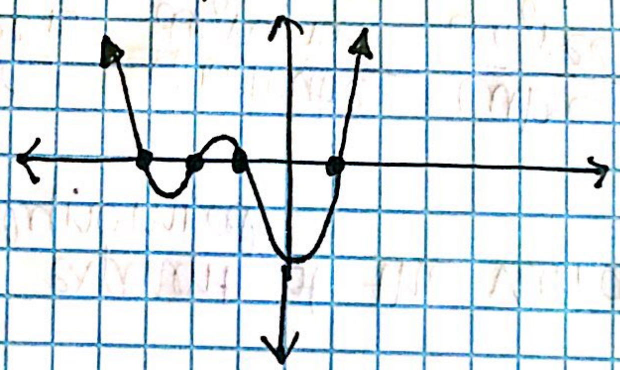


Zeros:
$x=-3$
$x=0$
$x=2$

Factored Form:

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

Example 2



Zeros:
$x=-3$
$x=-2$
$x=-1$
$x=1$

Factored Form:

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

Zeros

Multiplicity: tells us how often a zero occurs.
You can determine multiplicity from a graph or factored form.

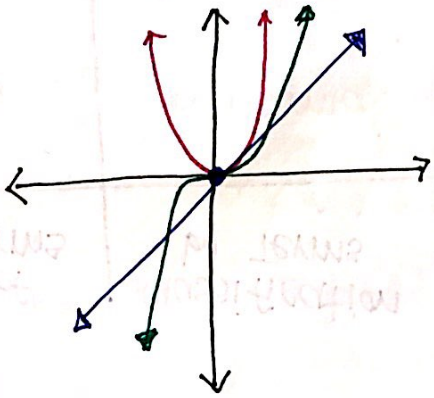
multiplicity 1
- single root
- cross through the x-axis

multiplicity 2
- double root
- Kisses the x-axis

* Even Degree

Multiplicity 3
- triple root
- cross through the x-axis, but flattens

* Odd Degree

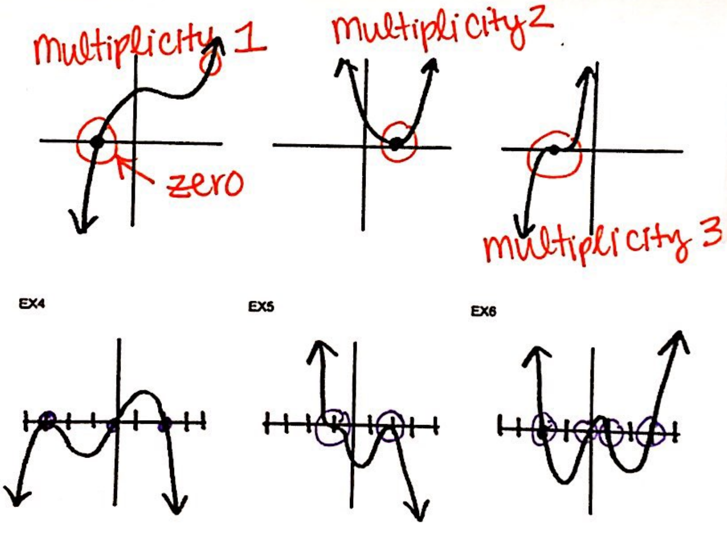


$y=x$

$y=x^2$

$y=x^3$

Zeroes and Multiplicity



Ex4

zeros: $x=-3$; mult. 2
$x=0$; mult. 1
$x=2$; mult. 1

Factored Form:

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

Ex5

Zeros: $x=-1$; mult. 3
$x=2$; mult. 2

Factored Form:

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

Ex6

zeros: $x=-2$; mult 1
$x=0$; mult 1
$x=1$; Mult 1
$x=3$; mult. 1

Factored Form:

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

Multiplicity

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