

Chapter 6 : Polynomials

Name (term number and highest degree)

$f(x) = x^3 + 4x - 3$       3 terms  $\rightarrow$  trinomial

3rd degree - "cubic" trinomial

$f(x) = 4x + x + 2$       2 terms  $\rightarrow$  binomial

$\underbrace{4x + x}_{5x} + 2$   
1st degree - "linear" binomial

- $x^3 \rightarrow$  cubic
- $x^2 \rightarrow$  quadratic
- $x \rightarrow$  linear
- $6 \rightarrow$  constant
- $x^5 \rightarrow$  5<sup>th</sup> degree

- # of terms
- 1  $\rightarrow$  monomial
  - 2  $\rightarrow$  binomial
  - 3  $\rightarrow$  trinomial
  - 4  $\rightarrow$  polynomial
  - or more

$x^7 - 3x^5 - 2$       7<sup>th</sup> degree trinomial

Find the zeros or "roots" of a function

$$f(x) = x(x+8)(x-2) \quad \text{X-int}$$

$$(x+8)(x-2)$$

$$x^2 - 2x + 8x - 16$$

$$x(x^2 + 6x - 16)$$

$$x^3 + 6x^2 - 16x$$

$$x(x+8)(x-2) = 0$$

$$x = 0$$

$$x + 8 = 0$$

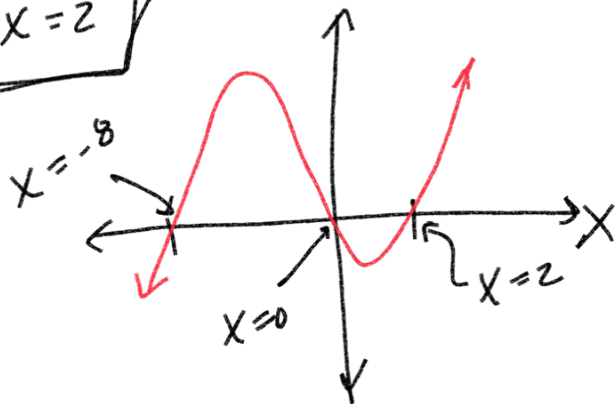
$$-8 \quad -8$$

$$x = -8$$

$$x - 2 = 0$$

$$+2 \quad +2$$

$$x = 2$$



$$f(x) = (x^2 - 4)(x^2 - 9)$$

Zeros

$$(x^2 - 4)(x^2 - 9) = 0$$

$$(x^2 - 4)(x^2 - 9)$$

$$x^4 - 9x^2 - 4x^2 + 36$$

$$x^2 - 4 = 0$$

$$+4 \quad +4$$

$$\sqrt{x^2} = \sqrt{4}$$

$$x = \pm 2$$

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

$$x^2 - 9 = 0$$

$$+9 \quad +9$$

$$\sqrt{x^2} = \sqrt{9}$$

$$x = \pm 3$$

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

highest degree term (4) indicates the highest number of real answers. up to 4 real solutions

$$f(x) = 3x(x+4)(x+5)^2 \quad \text{Zeros}$$

$$3x(x+4)(x+5)^2$$

multiplicity  $\sqrt{(x+5)^2} \neq 0$   $x+5=0$

$\frac{3x}{3} = \frac{0}{3}$ $x=0$	$x+4=0$ $-4 \quad -4$ $x=-4$	$x+5=0$ $-5 \quad -5$ $x=-5$	$x+5=0$ $-5 \quad -5$ $x=-5$
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$x=0$   
 $x=-4$   
 $x=-5$  mult of 2

$$3x(x+4)(x+5)^2$$

$$(x+5)(x+5)$$

$$x^2 + 5x + 5x + 25$$

$$(x+4)(x^2 + 10x + 25)$$

$$x^3 + 10x^2 + 25x$$

$$4x^2 + 40x + 100$$


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$$3x(x^3 + 14x^2 + 65x + 100)$$

$$3x^4 + 42x^3 + 195x^2 + 300x$$

$$f(x) = (x^2 + 16)(x-3)(x-5)^3$$

Find zeros

$$x^2 + 16 = 0$$

$$\begin{array}{r} -16 \quad -16 \\ \hline \end{array}$$

$$\sqrt{x^2} = \sqrt{-16}$$

$$x = \pm \sqrt{-16} = \pm \sqrt{16} \sqrt{-1}$$

$$x = \pm 4i$$

$$x-3=0$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$x=3$$

1 x-int  
1 solution  
1 real solution

$$x-5=0$$

$$\begin{array}{r} +5 \quad +5 \\ \hline \end{array}$$

$$x=5$$

1 x-int.

3 solutions  
3 real solutions

2 solutions  
real solutions  
0 solutions

6 solutions  
4 real solutions  
only 2 x-ints

Write a polynomial with the zeros:

3 answers

5, -1, 3

$$x=5$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$x-5=0$$

$$x=-1$$

$$\begin{array}{r} +1 \quad +1 \\ \hline \end{array}$$

$$x+1=0$$

$$x=3$$

$$\begin{array}{r} -3 \quad -3 \\ \hline \end{array}$$

$$x-3=0$$

Going backwards!

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

$$\begin{array}{r} x^2 + x \\ -5x - 5 \\ \hline \end{array}$$

$$(x-3)(x^2 - 4x - 5)$$

$$\begin{array}{r} x^3 - 4x^2 - 5x \\ -3x^2 + 12x + 15 \\ \hline \end{array}$$

3rd degree

$$x^3 - 7x^2 + 7x + 15$$

4, 3 (mult of 2)

$X = 4$   
 $-4 \quad -4$   
 $X - 4 = 0$

$X = 3$   
 $-3 \quad -3$   
 $X - 3 = 0$   
 $(X - 3)^2 = 0$

$(X - 4)(X - 3)^2$   
 $(X - 4)(X - 3)(X - 3)$   
 $X^2 - 3X - 4X + 12$

$(X - 3)(X^2 - 7X + 12)$

$X^3 - 7X^2 + 12X$   
 $-3X^2 + 21X - 36$

$X^3 - 10X^2 + 33X - 36$

HW

Ch 6.1 evens

Ch 6.2 evens

Supplemental WS

Online HW 28

Quiz 29 } May 6<sup>th</sup>

Test April 29<sup>th</sup>