OTHER TYPES OF FUNCTIONS

Note Title 2/5/2009

POLYNOMIAL FUNCTIONS

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x^1 + a_0$$

$$n \in I, \ n > 0$$

$$f(x) = 5x^{10} + 6x^5 + 3.25x^2 - \tfrac{4}{9}x - \pi$$

DEGREE OF THE POLYNOMIAL = 10

$\therefore$ MAX # OF ZEROS (X-INTERCEPT) = 10

RATIONAL FUNCTIONS

$$R(x) = \frac{P(x)}{Q(x)},$$ WHERE $P(x)$ AND $Q(x)$ ARE POLYNOMIAL FUNCTIONS

$$Q(x) \neq 0$$

IE $$\frac{x^2+5x+6}{x+2} = \frac{(x+2)(x+3)}{(x+2)} = x+3$$

$$x \neq -2$$

EXCLUDED VALUE

QUADRATIC FUNCTIONS

$$y = ax^2 + bx + c$$

IE $y = 5x^2 - 2x + 9$ OR $y = -2x^2$

QUADRATIC FORMULA $$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

VERTEX $$\left(\frac{-b}{2a}, \frac{c-b^2}{2a}\right)$$

PROOF OF THE QUADRATIC FORMULA

GIVEN $ax^2 + bx + c = 0$, PROVE THAT THE ROOTS ARE

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Proof

$$ax^2 + bx + c = 0$$

$$a\left(x^2 + \frac{b}{a}x\right) + c = 0$$

$$a\left(x^2 + \frac{b}{a}x + \left(\frac{1}{2}\frac{b}{a}\right)^2 - \left(\frac{1}{2}\frac{b}{a}\right)^2\right) + c = 0$$

$$a\left(x^2 + \frac{b}{a}x + \left(\frac{1}{2}\frac{b}{a}\right)^2\right) - a\left(\frac{1}{2}\frac{b}{a}\right)^2 + c = 0$$

$$a\left(x+\frac{1}{2}\frac{b}{a}\right)^2 - a\left(\frac{1}{2}\frac{b}{a}\right)^2 + c = 0$$

$$a\left(x+\frac{1}{2}\frac{b}{a}\right)\left(x+\frac{1}{2}\frac{b}{a}\right)$$

$$a\left(x+\frac{1}{2}\frac{b}{a}\right)^2 - a\left(\frac{1b^2}{4a^2}\right) + c = 0$$

$$\frac{a\left(x+\frac{1}{2}\frac{b}{a}\right)^2}{a} = \frac{a\left(\frac{1b^2}{4a^2}\right)}{a} - \frac{c}{a}$$

$$\left(x+\frac{1}{2}\frac{b}{a}\right)^2 = \frac{b^2}{4a^2} - \frac{c}{a} \leftarrow \frac{4a}{4a}$$

$$\left(x + \frac{1}{2}\frac{b}{a}\right)^2 = \frac{b^2}{4a^2} - \frac{4ac}{4a^2}$$

$$\left(x + \frac{1}{2}\frac{b}{a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm\sqrt{\frac{b^2 - 4ac}{4a^2}}$$

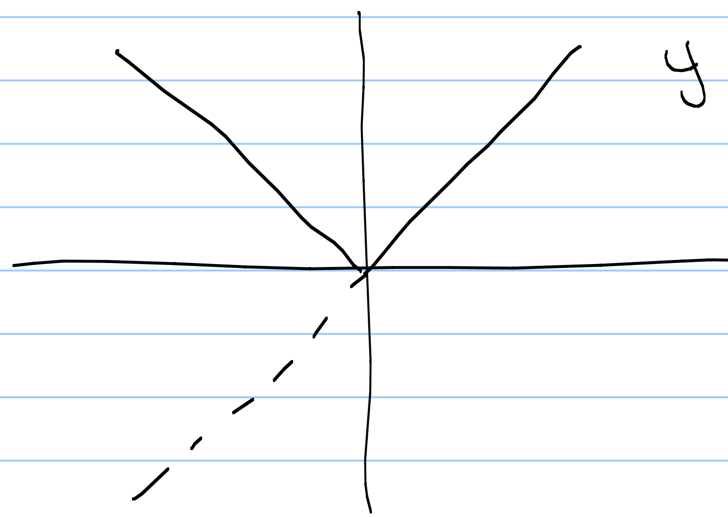
$$x + \frac{b}{2a} = \frac{\pm\sqrt{b^2 - 4ac}}{2a}$$

$$-\frac{b}{2a} \qquad\qquad -\frac{b}{2a}$$

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

ABSOLUTE VALUE FUNCTIONS



$y = |x|$

RADICAL FUNCTIONS (SQUARE ROOT)

$y = \sqrt{x}$

x	y
0	0
1	1
4	2
9	3

H/W pg 62 #29-76 (EVERY FOURTH)