2.4 Day 2

Obj: 1. Rational Zeros Thm
2. Find Real $ Rational Zeros

Rational #s: any # whose decimal part terminates or repeats (any # that can be written as a fraction).

$.333\overline{3} = \frac{1}{3}$ $\frac{2}{1}$

~~π~~ $\approx 3.14159\ldots$

Oct 10-9:44 AM

Rational Zeros Thm:

Let $f(x)$ be a polynomial of degree $n \geq 1$.

p is the constant term
q is the leading coefficient

If the fnc has a rational zero it will be

$x = \frac{p}{q}$

if p is an integer factor of the constant
$ q is an integer factor of the lead. coef.

Oct 10-9:47 AM

Find the potential rational zeros:

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

$p=1$

$q=1$

$x=\frac{\pm 1}{\pm 1}$

$x=-1, 1$

Oct 10-9:50 AM

Find the rational zeros:

$f(x)=3x^3+4x^2-5x-2$ (p = −2, q = 3)

$x=\frac{p}{q}=\frac{\pm 1, \pm 2}{\pm 1, \pm 3}=\pm 1, \pm\frac{1}{3}, \pm 2, \pm\frac{2}{3}$

graph it! looks like: -2, 1, $-\frac{1}{3}$ or $-\frac{2}{3}$

$(x+2)(x-1)$

-2 | 3 4 -5 -2

$\downarrow$ -6 4 2

1 | 3 -2 -1 0^* remainder

$\downarrow$ 3 -1 0^*

$-\frac{1}{3}$ | 3 -1 0^*

$\downarrow$

3 0^*

Oct 10-9:52 AM

Find the zeros:

$f(x) = 3x^3 - 7x^2 + 6x - 14$ (q = 3, p = 14)

$x = \frac{p}{q} = \frac{\pm 1, \pm 2, \pm 7, \pm 14}{\pm 1, \pm 3}$

$= \pm 1, \frac{1}{3}, 2, \frac{2}{3}, 7, \frac{7}{3}, 14, \frac{14}{3}$

looks like: between 2 & 3 : $\frac{7}{3}$

$\frac{7}{3}$ | 3 −7 6 −14

↓ 7 0 14

3 0 6 0*

Oct 10-9:59 AM

$f(x) = x^3 + x^2 - 8x - 6$

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

$x = \frac{p}{q} = \frac{\pm 1, 2, 3, 6}{\pm 1}$

looks like: -3 ($x+3$) others (not rational)

-3 | 1 1 −8 −6

↓ −3 6 6

$1x^2 - 2x - 2$ 0

If k is a zero, then x-k is a factor.

$x^2 - 2x - 2 = 0$

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

$x = \frac{2 \pm \sqrt{4 - 4(1)(-2)}}{2} = \frac{2 \pm \sqrt{12}}{2}$

$\sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$

$= \frac{2 \pm 2\sqrt{3}}{2}$

$= 1 \pm \sqrt{3}$

Oct 10-10:07 AM

$f(x)=x^4-3x^3-6x^2+6x+8$

$(x+1)(x-4)(x^2-2)$

$x=\frac{p}{q}=\frac{\pm 1,2,4,8}{\pm 1}$

$x^2-2=0$

$+2 \quad +2$

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

looks like: $-1, 4$ (2 others not rational)

$x=\pm\sqrt{2}$

-1	1	-3	-6	6	8
	↓	-1	4	2	-8
4	1	-4	-2	8	0
	↓	4	0	-8	
	$1x^2$	$0x$	-2	0	

Oct 10-10:14 AM