October 18, 2017

3.3 #9) $p(x) = -x^3 - 2x + 6$

$d(x) = x + 1$

	$-x^2$	x	-3
$x+1$ | $-x^3$	$+0x^2$	$-2x$	$+6$
	$\pm x^3$	$\pm x^2$	↓
	0	$+x^2$	$-2x$
		$\mp x^2$	$\mp x$
		0	$-3x$
			$\pm 3x$
			0

① $\frac{-x^3}{x} = -x^2$ ② $\frac{x^2}{x} = x$ ③ $\frac{-3x}{x} = -3$

$r(x) = 9$

$p(x) \quad d(x) \quad q(x) \quad r(x)$

$-x^3 - 2x + 6 = (x+1)(-x^2 + x - 3) + 9$

$= -x^3 + x^2 - 2x - x^2 + x - 3 + 9$

$= -x^3 - 2x + 6$ ✓

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#11) $p(x) = 2x^3 - 3x^2 - 2x$

$d(x) = 2x - 3$

	x^2	-1
$2x-3$ | $2x^3$	$-3x^2$	$-2x$ $+0$
	$\mp 2x^3$	$\pm 3x^2$ ↓ ↓
	0	0 $-2x$ 0
		$\pm 2x$ ∓ 3
		0 $+3$

① $\frac{2x^3}{2x} = x^2$ ② $\frac{-2x}{2x} = -1$

$2x^3 - 3x^2 - 2x + 0 = (2x-3)(x^2 - 1) + 3$

$= 2x^3 - 2x - 3x^2 + 3 + 3$

$= 2x^3 - 3x^2 - 2$

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#53) $p(x) = x^3 - 3x^2 + 3x - 1$

$c = 1$

Is $(x-1)$ a factor of p?

	x^2	$-2x$	1
$x-1$ | x^3	$-3x^2$	$+3x$	-1
	$\mp x^3$	$\pm x^2$ ↓	↓
	0	$-2x^2$	$+3x$ -1
		$\mp 2x^2$	$\mp 2x$ ± 1
		0	$-x$
			$\mp x$
			0 0 ← Remainder

① $\frac{x^3}{x} = x^2$ ② $\frac{-2x^2}{x} = -2x$ ③ $\frac{x}{x} = 1$

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Factor Theorem

c is a zero of p if and only if $x - c = 0$, $x = c$, is a factor.

e.g. $p(x) = x^2 - x - 12$

$0 = (x-4)(x+3)$

① $x - 4 = 0$, $x = 4$ → like $x - c$

② $x + 3 = 0$, $x = -3$

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$p(x) = x^2 - x - 12$

$c = 4$

test: $x - 4$

	x	3
$x-4$ | x^2	$-x$	-12
	$\mp x^2$	$\pm 4x$ ↓
	0	$+3x$ -12
		$\mp 3x$ ± 12
		0 0 ←

$\frac{x^2}{x} = x$ $\frac{3x}{x} = 3$

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Vertical & Horizontal Asymptotes

$r(x) = \frac{a_n x^n}{b_m x^m}$

Vertical Asym.: setting the denominator equal to zero & solve.

Horizontal Asym.

(a.) $n > m$, then H.A. of $y = 0$

(b.) $n = m$, then the H.A. $y = \frac{a_n}{b_m}$

(c.) $n < m$, then no H.A.!

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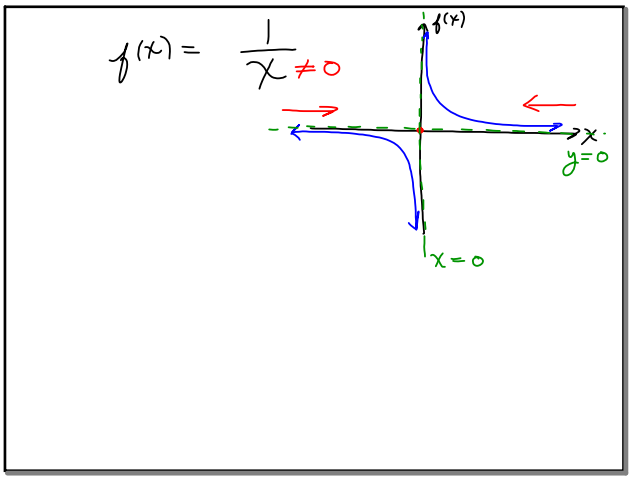

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