Pp. 291-292

12) $x^2 - 5x + 3 + \frac{9}{x-2}$

16) $4x^3 - 12x^2 + 36x - 110 + \frac{335}{x+3}$

19) $x^3 + x^2 + x + 1$

32) -4 is a root, 2 is not

34) 2 is a root, -1 is not

Oct 3-10:13 AM

Zeros of Polynomial Functions

Oct 23-8:27 PM

Rational Root Theorem

Polynomial Function: $P(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots a_{n-1}x + a_n$

Polynomial Equation: $a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \ldots a_{n-1}x + a_n = 0$

All the **rational** roots of a polynomial can be represented by $\frac{p}{q}$

Where p is a factor of a_n constant

And q is a factor of a_0 leading coefficient

Find the possible rational roots:

$3x^3 + 2x^2 - x - 12 = 0$ (q, p)

$p: \pm1, \pm2, \pm3, \pm4, \pm6, \pm12$

$q: \pm1, \pm3$

$\frac{p}{q}: \pm1, \pm\frac{1}{3}, \pm2, \pm\frac{2}{3}, \pm3, \pm4, \pm\frac{4}{3}, \pm6, \pm12$

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Find all the zeroes (roots):

1. $x^3 - 4x^2 - 7x + 10 = 0$ (q, p)

$p: \pm1, \pm2, \pm5, \pm10$

$q: \pm1$

$\frac{p}{q}: \pm1, \pm2, \pm5, \pm10$

$(x-5)(x-1)(x+2) = 0$

$-2 \mid 1 \;\; -4 \;\; -7 \;\; 10$

$\downarrow \;\; -2 \;\; 12 \;\; -10$

$1 \;\; -6 \;\; 5 \;\; 0$

$x^2 - 6x + 5 = 0$

$(x-5)(x-1) = 0$

$x-5=0 \quad | \quad x-1=0$

$x=5 \quad | \quad x=1$

$\{-2, 1, 5\}$

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2. $x^3 + 6x^2 - 13x - 6 = 0$ (q, p)

$p: \pm1, \pm2, \pm3, \pm6$

$q: \pm1$

$\frac{p}{q}: \pm1, \pm2, \pm3, \pm6$

$2 \mid 1 \;\; 6 \;\; -13 \;\; -6$

$\downarrow \;\; 2 \;\; 16 \;\; 6$

$1 \;\; 8 \;\; 3 \;\; 0$

$x^2 + 8x + 3 = 0$

$x^2 + 8x + 16 = -3 + 16$

$\sqrt{(x+4)^2} = \sqrt{13}$

$x + 4 = \pm\sqrt{13}$

$x = -4 \pm \sqrt{13}$

$\{2, -4 \pm \sqrt{13}\}$

$(x-2)(x-(-4+\sqrt{13}))(x-(-4-\sqrt{13})) = 0$

$(x-2)(x+4-\sqrt{13})(x+4+\sqrt{13}) = 0$

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3. $x^4 - 7x^3 + 13x^2 + 3x - 18 = 0$ (q, p)

$p: \pm1, \pm2, \pm3, \pm6, \pm9, \pm18$

$q: \pm1$

$\frac{p}{q}: \pm1, \pm2, \pm3, \pm6, \pm9, \pm18$

$2 \mid 1 \;\; -7 \;\; 13 \;\; 3 \;\; -18$

$\downarrow \;\; 2 \;\; -10 \;\; 6 \;\; 18$

$(2) \;\; 1 \;\; -5 \;\; 3 \;\; 9 \;\; 0$

$-1 \mid 1 \;\; -5 \;\; 3 \;\; 9$

$\downarrow \;\; -1 \;\; 6 \;\; -9$

$(x) \;\; 1 \;\; -6 \;\; 9 \;\; 0$

$x^2 - 6x + 9 = 0$

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

$x - 3 = 0$

$x = 3$ Double Root

$\{2, -1, 3\}$ (3 is a double root)

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

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pg 302: 51, 52, 44, 56, 58

QUIZ Thursday
NO CALCULATOR!

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