1. Factor Theorem:

Polynomial f(x) has a factor (x - c) iff f(c) = 0.

$f(x) = -2x^4 + 7x^3 + 9x^2 - 22x + 8$

Find P(4)

4	-2	7	9	-22	8
		-8	-4	20	-8
	-2	-1	5	-2	0

f(4) = 0, Therefore x - 4 is a factor of f(x)

$f(x) = 2x^4 + 7x^3 + 9x^2 - 22x + 8$

$= (2x^3 - x^2 + 5x - 2)(x - 4) + 0$

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

2. Rational Zero Test:

If polynomial $f(x) = a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + ... + a_2x^2 + a_1x + a_0$

has integer coefficients, every rational zero of f has the form $\frac{p}{q}$

where p and q have no common factors other than 1,

then p is a factor of a_0, and q is a factor of a_n.

3. Find all the Rational Candidates for Zeros of $f(x) = 6x^4 - 3x^3 + 2x^2 - 5x + 5$
All Factors of 5 are 1 and 5. These numbers make up possible ± numerators.
All Factors of 6 are 1, 2, 3, and 6. These numbers make up possible ± denominators.
Therefore, all possible Rational Candidates for Zeros are:

$$\boxed{\pm 1, \pm 5, \pm\frac{1}{2}, \pm\frac{5}{2}, \pm\frac{1}{3}, \pm\frac{5}{3}, \pm\frac{1}{6}, \pm\frac{5}{6}}.$$

Find the Rational Zeros of $f(x) = 2x^3 + 3x^2 - 8x + 3$

Possible Candidates come from $\frac{\textit{Factors of } 3 \quad \cdots \quad 1, 3}{\textit{Factors of } 2 \quad \cdots \quad 1, 2} = \pm\frac{1}{1}, \pm\frac{3}{1}, \pm\frac{1}{2}, \pm\frac{3}{2} = \boxed{\pm 1, \pm 3, \pm\frac{1}{2}, \pm\frac{3}{2}}$

By synthetic substitution, we can show that x = 1 is a zero

1	2	3	-8	3
		2	5	-3
	2	5	-3	0

This gives us:

$f(x) = (x - 1)(2x^2 + 5x - 3)$

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

Zeros are: $1, \frac{1}{2}, -3$

Find Zeros of $f(x) = 10x^3 - 15x^2 - 16x + 12$

Possiblle Candidates: $\frac{\text{Factors of } 12}{\text{Factors of } 10} = \frac{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12}{\pm 1, \pm 2, \pm 5, \pm 10}$

Eventually we can find that 2 is a zero

2	10	-15	-16	12
		20	10	12
	10	5	-6	0

$f(x) = (x - 2)(10x^2 + 5x - 6)$

We must use the quadratic formula to find the other zeros

They are: $\frac{-5 \pm \sqrt{25 - 4(10)(-6)}}{20} = \frac{-5 \pm \sqrt{265}}{20}$

Therefore: All zeros are

$2, \frac{-5 \pm \sqrt{265}}{20}$

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Pre-Calculus 1 Assignment 115 Friday, October 2, 2015 Hour Name

02.03 Real Zeros of Polynomial Functions

Exer.1-2: Use synthetic division to show that x is a solution of the third-degree polynomial equation, and use the result to factor the plynomial completely. List all the real zeros of the function.

1.	$x^3 - 7x + 6 = 0, x = 2$
2.	$x^3 - 28x - 48 = 0, x = -4$

Exer. 3-8: (a) verify the given factors of the function f, (b) find the remaining factors of f, (c) use your results to write the complete factorization of f, and (d) list all real zeros of f.

3.	$f(x) = 2x^3 + x^2 - 5x + 2$, $(x + 2)$
4.	$f(x) = 3x^3 + 2x^2 -19x + 6$ $(x + 3)$
5.	$f(x) = x^4 - 4x^3 - 15x^2 + 58x - 40$, $(x - 5)(x + 4)$
6.	$f(x) = 8x^4 - 14x^3 - 71x^2 - 10x + 24$ $(x + 2)$, $(x - 4)$
7.	$f(x) = 6x^3 + 41x^2 - 9x - 14$, $(2x + 1)$
8.	$f(x) = 2x^3 - x^2 - 10x + 5$, $(2x - 1)$

Exer. 9-10: Use the Rational Zeros Test to list all possible rational zeros of f.

9.	$f(x) = x^3 + 3x^2 - x – 3$
10.	$f(x) = 4x^5 - 8x^4 - 5x^3 + 10x^2 + x – 2$