Today's Plan:

Learning Target (standard): I will use the remainder theorem and factor to theorem to locate zeros of polynomials. I will use the zeros to factor the ploynomial.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Use the Factor Theorem to determine if the given binomial is a factor of the function.

$$f(x)=3x^4-6x^3-5x+10; x-2$$

$$f(2)=3(2)^4-6(2)^3-5(2)+10$$

$$=48-48-10+10$$

$$f(2)=0$$

$\therefore$ According to the Factor Theorem, (x-2) is a factor of f(x) because f(2) = 0 and that is the remainder after division.

Find the real zeros: (factor & solve)

$$f(x) = x^4 + x^2 - 2$$

$0 = x^4 + x^2 - 2$

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

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

$x = -1, 1$

$x^2+2=0$

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

$x = \sqrt{2}i, -\sqrt{2}i$

not real

Find the real zeros:

$$f(x) = 4x^4 + 7x^2 - 2$$

$0 = (4x^2-1)(x^2+2)$

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

$x = -\frac{1}{2}, \frac{1}{2}$

$x^2+2=0$

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

$x = \sqrt{2}i, -\sqrt{2}i$

not real

Find the real zeros:

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

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

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

$x = \frac{1}{2}$

$x^2 + 1 = 0$

$\sqrt{x^2} = \pm\sqrt{-1}$

$x = i, -i$

not real

List the potential rational zeros. (p's & q's)

$$f(x) = \underline{3}x^3 - x^2 - 15x + \underline{5}$$

$p: \pm 1, \pm 5$

$q: \pm 1, \pm 3$

$\frac{p}{q}: \pm 1, \pm\frac{1}{3}, \pm 5, \pm\frac{5}{3}$

Finding the Real Zeros of a Polynomial Function & Factoring

- Step 1: Use the degree of the polynomial to determine the maximum number of zeros.
- Step 2: If the polynomial has integer coefficients, use the Rational Zeros Theorem to identify potential rational zeros. (p & q's)

Finding Real Zeros continued

- Step 3: Use synthetic division to test each potential rational zero.
  (Factor Theorem)
- Step 4: Each time that a zero (and thus a factor) is found, repeat Step 3.
- Step 5: Completely factor the function.

* Once the function begins to factor, if the remaining non-factored portion is quadratic, this will either factor without p's & q's or you will need to use the quadratic formula or completing the square to completely factor.

$$f(x)=(x-1)\underline{(x^2+3x+5)}$$

quadratic formula

Find the real zeros & completely factor:

$f(x) = 1x^3 + 2x^2 - 5x - 6$

① MNZ: 3

② p: ±1, ±2, ±3, ±6

q: ±1

$\frac{p}{q}$: ±1, ±2, ±3, ±6

f(1) = 1+2-5-6

f(1) = -8

f(-1) = -1+2+5-6

f(-1) = 0

$$\begin{array}{r|rrrr} -1 & 1 & 2 & -5 & -6 \\ & & -1 & -1 & 6 \\ \hline & 1 & 1 & -6 & 0 \end{array}$$

$f(x) = (x+1)(x^2+x-6)$

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

Zeros: x = -1, -3, 2

Assignment:

p.261

#36-42 even (factor & real zeros)