

Warm-Up:

For $f(x) = 5x^2 + 3x - 4$, find

$$1) f(-1) = 5(-1)^2 + 3(-1) - 4$$

$$f(-1) = 5 - 3 - 4$$

$$f(-1) = -2$$

2) $2[f(v^2)]$

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

$$2 \left[f(v^2) \right] = (5v^4 + 3v^2 - 4) \cdot 2$$

$$2[f(v^2)] = 10v^4 + 6v^2 - 8$$

42, 22, 48

$$22) r(x) = x^3 + x + 1$$

$$r(3a) = (3a)^3 + (3a) + 1$$

$$r(3a) = 27a^3 + 3a + 1$$

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

$$42) 3[p(x^2-1)] + 4p(x)$$

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

$$p(x^2-1) = 3(x^4 - 2x^2 + 1) - 2(x^2-1) + 5$$

$$p(x^2-1) = 3x^4 - 6x^2 + 3 - 2x^2 + 2 + 5$$

$$p(x^2-1) = 3x^4 - 8x^2 + 10$$

$$3[3x^4 - 8x^2 + 10] + 4(3x^2 - 2x + 5)$$

$$9x^4 - 24x^2 + 30 + 12x^2 - 8x + 20$$

$$9x^4 - 12x^2 - 8x + 50$$

$$48) f(n) = \frac{1}{24}(n^4 - 6n^3 + 23n^2 - 18n + 24)$$

$$f(8) = \frac{1}{24}(8^4 - 6(8)^3 + 23(8)^2 - 18(8) + 24)$$

$$f(8) = \frac{1}{24}(4096 - 3072 + 1472 - 144 + 24)$$

$$f(8) = \frac{1}{24}(2376)$$

$$f(8) = 99$$

8 points

Section 6-6: Solving Polynomial Equations

Grouping is a method of factoring polynomials with four terms.

Example:

$$(x^3 + 2x^2) + (3x + 6) = 0$$

$$\underline{x^2(x+2)} + \underline{3(x+2)} = 0$$

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

$$\begin{array}{l} x+2=0 \text{ or } x^2+3=0 \\ \underline{-2 \quad -2} \end{array}$$

$$\sqrt{x^2+3}$$

$$x = -2$$

$$x = \pm i\sqrt{3}$$

When factoring follow the following guidelines:

- 1) Always look for a common factor.
- 2) Look at the number of terms:
 - a) Two terms - Try factoring as a difference of two squares or a sum or difference of two cubes.
 - b) Three terms - Check to see if it is a trinomial square. If it is, then factor as such. If it is not, test the factors of the terms.
 - c) Four terms - Try grouping.
- 3) Make sure it is always completely factored.

Examples:

Factor.

1) $10a^3b^2 + 15a^2b - 5ab^3$

$$5ab(2a^2b + 3a - b^2)$$

2) $(x^3 + 5x^2 - 2x - 10)$

$$x^2(x+5) - 2(x+5)$$

$$(x+5)(x^2-2)$$

Examples:

Factor.

3) $12y^3 - 8y^2 - 20y$

$$4y(3y^2 - 2y - 5)$$

$$4y(3y - 5)(y + 1)$$

4) $64x^6 - y^6$ $a = 4x^2$ $b = y^2$

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

$$(4x^2 - y^2)(16x^4 + 4x^2y^2 + y^4)$$

$$(2x + y)(2x - y)(16x^4 + 4x^2y^2 + y^4)$$

Examples:

Solve.

$$5) x^3 + 216 = 0 \quad a = x \quad b = 6$$

$$(x+6)(x^2 - 6x + 36) = 0$$

$$x+6=0 \text{ or } x^2 - 6x + 36 = 0$$

$$x = -6$$

$$x = \frac{6 \pm \sqrt{(-6)^2 - 4(1)(36)}}{2(1)}$$

$$x = \frac{6 \pm \sqrt{36 - 144}}{2}$$

$$x = \frac{6 \pm \sqrt{-108}}{2}$$

$$x = \frac{6 \pm \sqrt{36} \sqrt{3}}{2}$$

$$x = \frac{6 \pm 6i\sqrt{3}}{2}$$

$$x = 3 \pm 3i\sqrt{3}$$

$$6) x^4 - 29x^2 + 100 = 0$$

$$(x^2 - 4)(x^2 - 25) = 0$$

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

$$x = \pm 2, \pm 5$$

Homework: pg. 353-355 #14-22 even, 30-35 all,
42-46 even 60-62 all