## Exam 4 Review

Note: This is not a complete list of topics - you should study your lecture notes and homework in addition to reviewing the items listed here.

- 1. vocabulary
  - a. polynomial
  - b. leading term
  - c. leading coefficient
  - d. degree (the largest exponents **not** the sum!)
  - e. monomial, binomial, trinomial
  - f. linear, quadratic, cubic

2. multiplying polynomials 
$$\Rightarrow$$
  $(x+2)(x^2+3x+5) = x(x^2+3x+5) + 2(x^2+3x+5) = \dots$ 

- 3. FOIL method for multiplying binomials First Outside Inside Last
- 4. special products

a. 
$$(a+b)(a-b) = a^2 - b^2$$

- b.  $(a+b)^2 = a^2 + 2ab + b^2$
- c.  $(a-b)^2 = a^2 2ab + b^2$
- 5. dividing polynomials
  - a. long division

long division  

$$3x + 2\overline{\smash{\big)}6x^2 + 16x + 15} \implies \frac{6x^2 + 16x + 15}{3x + 2} = 2x + 4 + \frac{7}{3x + 2}$$

$$\underline{6x^2 + 4x}$$

$$12x + 15$$

$$\underline{12x + 8}$$

$$7$$

b. synthetic division

$$\frac{x^3 + 3x - 7}{x + 1} \implies \frac{-1}{1} \stackrel{1}{\xrightarrow{-1}} \stackrel{0}{\xrightarrow{-1}} \stackrel{3}{\xrightarrow{-1}} \stackrel{-7}{\xrightarrow{-1}} \implies \frac{x^3 + 3x - 7}{x + 1} = x^2 - x + 4 - \frac{11}{x + 1}$$

6. Remainder Theorem

If the polynomial P(x) is divided by x - a, then the remainder is the value P(a).

7. common factors

ab + ac = a(b + c)

- 8. factoring by grouping  $\underline{ab + ac} + \underline{db + dc} = a(b + c) + d(b + c) = (b + c)(a + d)$
- 9. factoring trinomials
  - a.  $x^2 + bx + c \implies$  look for factors of c whose sum is b
  - b.  $ax^2 + bx + c$ 
    - i. multiply  $a \cdot c$
    - ii. look for factors of  $a \cdot c$  whose sum is b
    - iii. rewrite bx as two terms with coefficients from the previous step
    - iv. factor by grouping
- 10. special factors
  - a.  $a^2 b^2 = (a+b)(a-b)$ b.  $a^2 + 2ab + b^2 = (a+b)^2$ c.  $a^2 - 2ab + b^2 = (a-b)^2$ d.  $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$ e.  $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
- 11. solving equations by factoring

Remember - the equation must always be equal to zero first!