

1. (3pts) Verify the difference of cubes formula by simplifying:

$$(x-a)(x^2+ax+a^2) = x^3 + \cancel{ax^2} + \cancel{xa^2} - \cancel{ax^2} - \cancel{a^2x} - a^3$$

$$= x^3 - a^3$$

2. (5pts) Use formulas to expand:

a)  $(3x+4)^2 = 9x^2 + 24x + 16$

b)  $(x-5)^3 = x^3 - 15x^2 + 75x - 125$

3. (8pts) Factor the following. Use either a known formula or a factoring method.

a)  $x^2 - 5x - 24 = (x-8)(x+3)$

prod = -24

sum = -5     -8, 3

b)  $2x^2 - 7x - 15 = 2x^2 - 10x + 3x - 15 = 2x(x-5) + 3(x-5)$

AC = -30

prod = -30     -10, 3

sum = -7

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

c)  $x^3 - 27 = x^3 - 3^3 = (x-3)(x^2 + 3x + 9)$

4. (9pts) Simplify.

$$a) \frac{2x+1}{x^2-x-12} + \frac{x}{x^2+6x+9} = \frac{2x+1}{(x-4)(x+3)} + \frac{x}{(x+3)^2} =$$

$$= \frac{(2x+1)(x+3) + x(x-4)}{(x-4)(x+3)(x+3)} = \frac{2x^2+7x+3+x^2-4x}{(x-4)(x+3)(x+3)}$$

$$= \frac{3x^2+3x+3}{(x-4)(x+3)^2} = \frac{3(x^2+x+1)}{(x-4)(x+3)^2}$$

doesn't factor. prod = 1  
sum = 1 (no such integers)

$$b) \frac{x - \frac{15}{x+2}}{3 - \frac{3}{x+4}} = \frac{\frac{x(x+2) - 15}{x+2}}{\frac{3(x+4) - 3}{x+4}} = \frac{\frac{x^2+2x-15}{x+2}}{\frac{3x+9}{x+4}} = \frac{(x+5)(x-3)}{x+2} \cdot \frac{x+4}{3(x+3)}$$

$$= \frac{(x+5)(x-3)(x+4)}{3(x+2)(x+3)}$$