1. (6pts) Simplify:

a) $(3x - 1)(-2x + 5) = -6x^2 + 17x - 5$

b) $(x + 6)(x - 6) - 4x(3x - 5) = x^2 - 36 - 12x^2 + 20x$

$$= -11x^2 + 20x - 36$$

c) $(x^2 + 3x - 5)(4x - 1) = 4x^3 + 12x^2 - 20x - x^2 - 3x + 5$

$$= 4x^3 + 11x^2 - 23x + 5$$

2. (3pts) Verify the formula for the cube of a sum by multiplying out the factors:

$(x + a)^3 = (x + a)^2(x + a) = (x^2 + 2xa + a^2)(x + a) =$

$$= x^3 + 2x^2a + a^2x + x^2a + 2xa^2 + a^3 =$$

$$= x^3 + 3x^2a + 3xa^2 + a^3$$

3. (5pts) Use formulas to expand:

a) $(3x - 5)^2 = (3x)^2 - 2 \cdot 3x \cdot 5 + 5^2 = 9x^2 - 30x + 25$

b) $(2x + 4)^3 = (2x)^3 + 3(2x)^2 \cdot 4 + 3(2x) \cdot 4^2 + 4^3$

$$= 8x^3 + 48x^2 + 96x + 64$$

4. (8pts) Factor the following. Use either a known formula or a factoring method.

a) $x^2 - 2x - 35 = (x-7)(x+5)$

$prod = -35$ $\quad -7, 5$

$sum = -2$

b) $6x^2 - 7x - 10 = 6x^2 - 12x + 5x - 10 = 6x(x-2) + 5(x-2)$

$AC = -60$

$prod = -60$ $\quad -12, 5$ $\qquad\qquad\qquad = (6x+5)(x-2)$

$sum = -7$

c) $x^3 + 125 = x^3 + 5^3 = (x+5)(x^2 - 5x + 25)$

5. (8pts) Simplify.

a) $\dfrac{x+1}{x^2-64} + \dfrac{2x-3}{x^2+7x-8} = \dfrac{x+1}{(x-8)(x+8)} + \dfrac{2x-3}{(x+8)(x-1)}$

$= \dfrac{(x+1)(x-1) + (2x-3)(x-8)}{(x-8)(x+8)(x+1)} = \dfrac{x^2-1 + 2x^2 - 19x + 24}{(x-8)(x+8)(x+1)}$

$= \dfrac{3x^2 - 19x + 23}{(x-8)(x+8)(x+1)}$

b) $\dfrac{1 - \dfrac{3x}{x^2-4}}{\dfrac{x+1}{x+2}} = \dfrac{\dfrac{x^2-4-3x}{x^2-4}}{\dfrac{x+1}{x+2}} = \dfrac{x^2-3x-4}{x^2-4} \cdot \dfrac{x+2}{x+1} =$

$= \dfrac{(x-4)(x+1)}{(x-2)(x+2)} \cdot \dfrac{x+2}{x+1} = \dfrac{x-4}{x-2}$