Fall '07/MAT 150/Worksheet 1 **Name:** Solution *Show all your work.*

1. (11pts) Use formulas to expand:

a) $(x+2z)^2 =$ $x^2 + 2x \cdot 2z + (2z)^2 = x^2 + 4xz + 4z^2$

b) $(5x-7)(5x+7) =$ $(5x)^2 - 7^2 = 25x^2 - 49$

c) $(x^3+4y)^2 =$ $(x^3)^2 + 2x^3 4y + (4y)^2 = x^6 + 8x^3y + 16y^2$

d) $(x-2)^3 =$ $x^3 - 3x^2 \cdot 2 + 3x \cdot 2^2 - 2^3 = x^3 - 6x^2 + 12x - 8$

2. (8pts) Factor the following. Use either a known formula or a factoring method.

a) $x^2+3x-28 =$ $(x+7)(x-4)$

prod = −28
sum = 3   7, −4

b) $6x^2+7x-5 =$ $6x^2 + 10x - 3x - 5 = 2x(3x+5) - (3x+5) = (2x-1)(3x+5)$

$6 \cdot (-5) = -30$ prod = −30
sum = 7   10, −3

c) $x^3+64 =$ $x^3 + 4^3 = (x+4)(x^2 - x \cdot 4 + 4^2)$

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

3. (3pts) Verify the formula for the difference of cubes by multiplying out:

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

$= x^3 - a^3$

4. (8pts) Simplify.

a) $\dfrac{3x+7}{x^2+x-20} - \dfrac{x+1}{x^2+5x} = \dfrac{3x+7}{(x+5)(x-4)} - \dfrac{x+1}{x(x+5)}$

$= \dfrac{(3x+7)x - (x+1)(x-4)}{(x+5)(x-4)x}$

$= \dfrac{3x^2+7x-(x^2-3x-4)}{(x+5)(x-4)x} = \dfrac{2x^2+10x+4}{(x+5)(x-4)x}$

$= \dfrac{2(x^2+5x+2)}{(x+5)(x-4)x} \longleftarrow$ doesn't factor

b) $\dfrac{6-\dfrac{x-1}{x+4}}{2x+\dfrac{x-5}{x+4}} = \dfrac{\dfrac{6(x+4)-(x-1)}{x+4}}{\dfrac{2x(x+4)+x-5}{x+4}} = \dfrac{5x+25}{\cancel{x+4}} \cdot \dfrac{\cancel{x+4}}{\underbrace{2x^2+9x-5}}$

$2(-5) = -10$

prod $= -10$ $\quad 10, -1$

sum $= 9$

$2x^2+10x-x-5$

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

$= (2x-1)(x+5)$

$= \dfrac{5\cancel{(x+5)}}{(2x-1)\cancel{(x+5)}} = \dfrac{5}{2x-1}$