Fall '09/MAT 140/Worksheet 1 **Name:** Solution *Show all your work.*

1. (6pts) Simplify and write the answer so all exponents are positive:

a) $(x^{-3}y^6)^3x^4y^{-5} =$ $x^{-9}y^{18}x^4y^{-5} = x^{-9+4}y^{18-5}$

$= x^{-5}y^{13} = \dfrac{y^{13}}{x^5}$

b) $\dfrac{4x^{-2}(3y)^2}{(6x^{-3}y^4)^2} =$ $\dfrac{\cancel{4}x^{-2}\cdot\cancel{9}y^2}{\cancel{36}x^{-6}y^8} = x^{-2-(-6)}y^{2-8} = x^4y^{-6} = \dfrac{x^4}{y^6}$

2. (2pts) Convert to scientific notation or a decimal number:

$\underbrace{5353789}_{6 \text{ places}} = 5.353789 \times 10^6$

$\underbrace{000\,1}_{4 \text{ places}}.5917 \times 10^{-4} = 0.00015917$

3. (4pts) Simplify and write in standard form:

a) $(2x-5)(-3x+2) = -6x^2+4x+15x-10$

$= -6x^2+19x-10$

b) $(x+4)(x-4) - 3x(2x+1) =$ $x^2-16-(6x^2+3x)$

$= x^2-16-6x^2-3x$

$= -5x^2-3x-16$

4. (8pts) Use formulas to expand:

a) $(2x-7)^2 = (2x)^2 - 2\cdot 2x \cdot 7 + 7^2$

$= 4x^2 - 28x + 49$

b) $(4x-9)(4x+9) = (4x)^2 - 9^2 = 16x^2 - 81$

c) $(2x+5)^3 = (2x)^3 + 3(2x)^2\cdot 5 + 3\cdot 2x\cdot 5^2 + 5^3 = 8x^3 + 60x^2 + 150x + 125$

$3\cdot 4x^2\cdot 5 \quad 3\cdot 2x\cdot 25$

5. (8pts) Factor the following. Use either a known formula or a factoring method.

a) $x^2 + 4x - 21 = (x+7)(x-3)$

prod $= -21$ $\quad 7, -3$

sum $= 4$

b) $9x^2 - 12x \pm 5 =$ $9x^2 - 15x + 3x - 5 = 3x(3x-5) + 3x - 5 = (3x-5)(3x+1)$

prod $= -45$	$9, -5$ $5, -9$	$3, -15$
sum $= -12$	no	yes

c) $x^3 - 216 = x^3 - 6^3 = (x-6)(x^2+6x+36)$

6. (2pts) Verify the formula for the sum of cubes by multiplying out the factors:

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