Mathematical Concepts — Joysheet 1 **MAT 117, Fall 2012 — D. Ivanšić**	**Name:** Saul Ocean *Show all your work!*

1. (12pts) Simplify and write the answer so all exponents are positive:

a) $(2x^2y^{-4})^5(4x^{-3}y^{-7})^3 = 2^5(x^2)^5(y^{-4})^5\, 4^3(x^{-3})^3(y^{-7})^3$

$= 32x^{10}y^{-20} \cdot 64x^{-9}y^{-21}$

$= 2048xy^{-41} = \dfrac{2048x}{y^{41}}$

b) $\dfrac{(6u^3v^{-5})^2}{(9u^2v^{-4})^3} = \dfrac{6^2(u^3)^2(v^{-5})^2}{9^3(u^2)^3(v^{-4})^3} = \dfrac{\overset{4}{\cancel{36}}\cancel{u^6}v^{-10}}{\underset{1}{\cancel{9}}\cdot 9\cdot 9\cancel{u^6}v^{-12}} = \dfrac{4}{81}v^2$

$-10-(-12)$

2. (4pts) Convert to scientific notation or a decimal number:

$3.32906 \times 10^5 =$ 332,906

$0.00002387 = 2.387 \times 10^{-5}$ (negative exponent since number is < 1)

3. (8pts) Simplify and write in standard form:

a) $x^2(7x+1) - (x-4)(2x+5) = 7x^3 + x^2 - (2x^2 - 8x + 5x - 20$ $-3x$

$= 7x^3 + x^2 - x^2 + 3x + 20$

$= 7x^3 - x^2 + 3x + 20$

b) $(3x+5)(x^2-7x-4) = 3x^3 - 21x^2 - 12x + 5x^2 - 35x - 20$

$= 3x^3 - 16x^2 - 47x - 20$

4. (15pts) Use formulas to expand:

a) $(2x-7)(2x+7) =$ $(2x)^2 - 7^2 = 4x^2 - 49$

b) $(3x+5y)^2 =$ $(3x)^2 + 2\cdot(3x)\cdot(5y) + (5y)^2 = 9x^2 + 30xy + 25y^2$

c) $(5x-2)^3 =$ $(5x)^3 - 3\cdot(5x)^2\cdot 2 + 3\cdot(5x)\cdot 2^2 - 2^3$

$= 125x^3 - 150x^2 + 60x - 8$

5. (15pts) Factor the following. Use either a known formula or a factoring method.

a) $x^2 - 10x - 24 =$ $(x-12)(x+2)$

prod $= -24$ $\quad -12, 2$

sum $= -10$

b) $6x^2 - 29x - 5 =$ $6x^2 - 30x + x - 5 = 6x(x-5) + x - 5$

prod $= -30$ $\quad -30, 1$ $\quad = (x-5)(6x+1)$

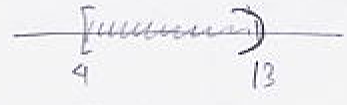
sum $= -29$

c) $64v^3 + 8 =$ $(4v)^3 + 2^3 = (4v+2)((4v)^2 - 4v\cdot 2 + 2^2)$

$= (4v+2)(16v^2 - 8v + 4)$

6. (6pts) Write the following sets in interval notation. Then graph the interval.

$\{x \mid 4 \le x < 13\}$ $\quad [4, 13)$



$\{x \mid x \ge -5\}$ $\quad [-5, \infty)$

$\{x \mid x < 3\}$ $\quad [-\infty, 3)$