

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

$$\begin{aligned} \text{a) } (2x^2y^{-4})^5(4x^{-3}y^{-7})^3 &= 2^5(x^2)^5(y^{-4})^5 \cdot 4^3 \cdot (x^{-3})^3(y^{-7})^3 \\ &= 32x^{10}y^{-20} \cdot 16 \cdot x^{-9}y^{-21} \\ &= 2048x^1y^{-41} = \frac{2048x}{y^{41}} \end{aligned}$$

$$\text{b) } \frac{(6u^3v^{-5})^2}{(9u^2v^{-4})^3} = \frac{6^2(u^3)^2(v^{-5})^2}{9^3(u^2)^3(v^{-4})^3} = \frac{2 \cdot 6 \cdot 6 u^6 v^{-10}}{3 \cdot 3 \cdot 3 u^6 v^{-12}} = \frac{4v^2}{81}$$

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

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

$$0.00002387 = 2.387 \times 10^{-5}$$

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

$$\begin{aligned} \text{a) } x^2(7x+1) - (x-4)(2x+5) &= 7x^3 + x^2 - (2x^2 - 8x + 5x - 20) \\ &= 7x^3 + x^2 - 2x^2 + 3x + 20 \\ &= 7x^3 - x^2 + 3x + 20 \end{aligned}$$

$$\begin{aligned} \text{b) } (3x+5)(x^2-7x-4) &= 3x^3 - 21x^2 - 12x + 5x^2 - 35x - 20 \\ &= 3x^3 - 16x^2 - 47x - 20 \end{aligned}$$

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

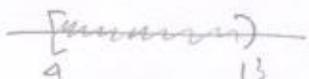
prod = -24 -12, 2
sum = -10

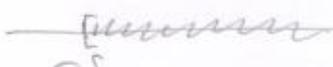
b) $6x^2 - 29x - 5 = 6x^2 + x - 30x - 5 = x(6x + 1) - 5(6x + 1)$

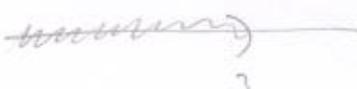
prod = -30 -30, 1
sum = -29
 $= (x - 5)(6x + 1)$

c) $64v^3 + 8 = 8(8v^3 + 1) = 8((2v)^3 + 1^3) = 8(2v + 1)((2v)^2 - 2v \cdot 1 + 1^2)$
 $= 8(2v + 1)(4v^2 - 2v + 1)$

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

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

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

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