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

a) $(x^4 y^7)^{-2} x^{11} y^5 =$ $x^{-8} y^{-14} x^{11} y^5$

$$= x^3 y^{-9} = \frac{x^3}{y^9}$$

b) $\dfrac{5x^3 (2y)^4}{(10x^2 y^{-4})^3} =$ $\dfrac{5x^3 \cdot 2^4 y^4}{10^3 x^6 y^{-12}} = \dfrac{\overset{1}{\cancel{5}} \cdot \overset{2}{\cancel{16}} x^{-3} y^{16}}{\underset{\underset{25}{\cancel{125}}}{\cancel{1000}}} = \dfrac{2y^{16}}{25x^3}$

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

$1.4375 \times 10^8 =$ 143750000

$0.000000326 =$ 3.26×10^{-7}

7 spaces

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

a) $(3x - 1)(2x + 5) - x(7x + 4) =$ $6x^2 + 15x - 2x - 5 - 7x^2 - 4x$

$$= -x^2 + 9x - 5$$

b) $(x + 2)(3x^2 - 4x + 5) =$ $3x^3 - 4x^2 + 5x + 6x^2 - 8x + 10$

$$= 3x^3 + 2x^2 - 3x + 10$$

4. (15pts) Use formulas to expand:

a) $(2x - 5)(2x + 5) = (2x)^2 - 5^2 = 4x^2 - 25$

b) $(3x - 8)^2 = (3x)^2 - 2\cdot(3x)\cdot 8 + 8^2 = 9x^2 - 48x + 64$

c) $(4x + 3)^3 = (4x)^3 + 3\cdot(4x)^2\cdot 3 + 3\cdot 4x\cdot 3^2 + 3^3$
$$= 64x^3 + 144x^2 + 108x + 27$$

5. (14pts) Factor the following. Use either a known formula or a factoring method.

a) $x^2 - 4x - 32 = (x - 8)(x + 4)$

$prod = -32 \quad -8, 4$
$sum = -4$

b) $18x^2 - 9x - 5 = 18x^2 - 15x + 6x - 5 = 3x(6x - 5) + (6x - 5)$

$prod = 18\cdot(-5) = -90 \quad -15, 6$
$sum = -9 \qquad\qquad = (3x + 1)(6x - 5)$

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

6. (7pts) Find the two errors in the computation. Then redo the computation correctly.

$(x + 7)^2 - 3(x - 5) = x^2 + 49 - 3x - 15 = x^2 - 3x + 34$

$(x+7)^2 = x^2 + 2\cdot x\cdot 7 + 7^2 \qquad -3(x-5) = -3x + 15$
$\qquad\qquad not \; x^2 + 49 \qquad\qquad\quad not \; -3x - 15$

$= x^2 + 2\cdot x\cdot 7 + 49 - 3x + 15$
$= x^2 + 11x + 64$