Math 110 Quiz #3 Name _____

Instructions: Read carefully. Show your work.

1. (3 pts) Compute $\dfrac{4.6 \times 10^{12}}{2.3 \times 10^{7}}$

$$\begin{aligned}\frac{4.6 \times 10^{12}}{2.3 \times 10^{7}} &= \frac{4.6}{2.3} \cdot \frac{10^{12}}{10^{7}} \\ &= 2 \times 10^{12-7} = 2 \times 10^{5}.\end{aligned}$$

2. Simplify each expression. There should be no negative exponents in your answer.

(a) (4 pts) $\dfrac{3^4 z^{-3} z^6}{3^{-3} z^{-2}}$

$$\begin{aligned}\frac{3^4 z^{-3} z^6}{3^{-3} z^{-2}} &= 3^{4-(-3)} z^{6+(-3)-(-2)} \\ &= 3^7 z^5\end{aligned}$$

(b) (4 pts) $\dfrac{3xy^{-1}}{(5xy^2)^{-1}}$

$$\begin{aligned}\frac{3xy^{-1}}{(5xy^2)^{-1}} &= \frac{3xy^{-1}}{5^{-1}x^{-1}y^{-2}} \\ &= 3 \cdot 5x^{1-(-1)} y^{-1-(-2)} = 15x^2 y\end{aligned}$$

(c) (5 pts) $\dfrac{(5a^{-1}b^2)^3}{(5ab^{-2})^4}$

$$\begin{aligned}\frac{(5a^{-1}b^2)^3}{(5ab^{-2})^4} &= \frac{5^3 a^{-3} b^6}{5^4 a^4 b^{-8}} \\ &= \frac{b^{6-(-8)}}{5^{4-3} a^{4+3}} = \frac{b^{14}}{5a^7}\end{aligned}$$

3. (7 pts each) Solve each system of equations and state the solution set. State whether the system is dependent, independent, or inconsistent.

(a) $5x - 4y = 9$
$8y - 10x = -18$
Multiply the first equation by 2, and reorder the terms in the second:

$$\begin{aligned} 10x - 8y &= 18 \\ -10x + 8y &= -18 \end{aligned}$$

Adding the two equations, we get $0 = 0$. This is a true statement, so the system is *dependent*. The solution set is $\{(x, y) \mid 5x - 4y = 9\}$.

(b) $6x + 3y = 4$
$y = \frac{2}{3}x$
In the form given, solving by substitution seems best:

$$\begin{aligned} 6x + 3\left(\frac{2}{3}x\right) &= 4 \\ 6x + 2x &= 4 \\ 8x &= 4 \\ x &= \frac{1}{2}. \end{aligned}$$

Now use this value of x to solve for y:

$$y = \frac{2}{3} \cdot \frac{1}{2} = \frac{1}{3}.$$

So this system is *independent*, and the solution set is $\left\{\left(\frac{1}{2}, \frac{1}{3}\right)\right\}$.