Math 127
Worksheet 1: Algebraic Expressions, Sets, Real Numbers, and Exponents

Name: _____

1. Simplify each of the following:

   (a) $40 + 10 \div 5 + 3 \cdot -2^2$

   (c) $-9 - 5\left[\dfrac{11 - 9(-1)}{4(-5) + 2(5)}\right]$

   (e) $\dfrac{7}{12} \div \dfrac{5}{6}$

   (b) $-\left|-\left(-\left(-\frac{2}{3} + 1\right)\right)\right|$

   (d) $\dfrac{4}{7} - \dfrac{5}{6}$

   (f) $5x + 3(-2x + 7) - 24$

2. Evaluate each of the following:

   (a) $4x - 3$ if $x = 2$

   (b) $3x^2 - 2xy$ if $x = -1$ and $y = 3$

   (c) $x^3 - 5(x - 2y)$ if $x = 1$ and $y = 2$

3. Perform the following set operations:

   (a) $\{2, 3, 7, 9\} \cup \{3, 5, 7, 11\}$

   (b) $\{a, b, c, d, e\} \cap \{a, e, i, o, u\}$

   (c) $(\{1, 2, 3, 4\} \cup \{a, b, c, d\}) \cap \{1, b, 3, f\}$

4. Place the appropriate symbol ($<$, $>$, or $=$) to make the statement true:

   (a) $-9 \qquad -4$

   (b) $|-9| \qquad -4$

   (c) $|4 - 9| \qquad |9 - 4|$

5. Simplify each of the following algebraic expressions:

(a) $7(x-2)-(3x-7)$

(b) $3x(x-2)+(x^2+3x-2)$

(c) $(3-x^2)-(3+x)^2$

6. Simplify each of the following using the properties of exponents. Your answer should contain only positive exponents.

(a) $\left(a^4b^7\right)^3 \cdot b^3$

(b) $\left(2y^4\right)^{-2} \cdot 16y^{\frac{2}{5}}$

(c) $\dfrac{7a^5b^{-3}}{21a^3b^{-5}}$

(d) $\dfrac{\left(x^{-4}\right)^3\left(x^3\right)^{-4}}{x^{12}}$

(e) $\left(\dfrac{5x^5y^4}{10x^2y^{-3}}\right)^3$

(f) $\left(\dfrac{a^3b^2c}{a^{-1}b^{-2}c^{-3}}\right)^{-2}$