Worksheet 1: Algebra Review

Name: _____

In your solutions to the exercises below, **show the algebraic work** that leads to the final answer.

Simplifying Algebraic Expressions

1. Simplify the following expressions.

   (a) $\dfrac{1}{3^{-2}} - \dfrac{1}{3} + \dfrac{1}{4^{-1}}$.

   (b) $\dfrac{(x^2 y^{-3})^2}{(y^{-3} x^{-2})^{-2}}$.

   (c) If $f(x) = x^2 + 3x$ and $h \neq 0$, then simplify $\dfrac{f(x+h) - f(x)}{h}$.

   (d) Rationalize $\dfrac{3}{x - \sqrt{x}}$.

Intervals

2. Write the following in interval notation.

   (a) The open interval with endpoints 2 and 3.

   (b) The half-open interval with endpoints 2 and 3 that contains 2 but not 3.

Solving Equations

3. Solve for x: $2y^2 x - y^2 - (1 + 3y) = x$.

4. Find the solutions of $\dfrac{x^2}{3} + 2x - 1 = 0$ exactly.

5. Find the solutions of $\dfrac{1}{x-4} + \dfrac{1}{x+4} = \dfrac{4}{x^2 - 16}$ exactly.

Exponential and Logarithmic Functions

6. Simplify the following.

(a) $\dfrac{2^{5x}}{2^x}$

(b) $e^{2x}e^{-3x}$

7. Evaluate $\log_4(1/64)$.

8. Solve for t in the equation $\ln(t) - \ln(t^2) = 5$ exactly.

Trigonometric Functions

9. On the unit circle mark off the following angles (in radians):

(a) $\dfrac{\pi}{2}, \pi,$ and $-\dfrac{\pi}{2}$ together

(b) $\dfrac{\pi}{3}$ and $\dfrac{2\pi}{3}$ together.

Inverse Functions

10. Find the inverse of each of the following functions, including the domain.

(a) $f(x) = \dfrac{x}{1 + 2x}$ for $x \neq -\dfrac{1}{2}$

(b) $f(x) = \sqrt{18 - 2x^2}$ for $0 \leq x \leq 3$.

(c) $f(x) = \ln(e^{2x} + 1)$ for all x.