Names: _____ _____ _____

Activity #9: Exponentials and Logs (Solutions) **College Algebra**

1. Solve the following equation.

$$3^{5x-1} = 27^{x-3}$$

Solution: Note that 27 is a nice power of 3: $27 = 3^3$. We can rewrite this equation as

$$3^{5x-1} = (3^3)^{x-3}.$$

We can now use the property of exponents that $(x^m)^n = x^{mn}$ to write this equation as

$$3^{5x-1} = 3^{3(x-3)}.$$

Remember that two exponential expressions with the same base are equal if and only if their exponents are equal; so we can write our equation as

$$5x - 1 = 3\,(x - 3)\,,$$

which is linear. We can now solve for x to get $\boxed{x = 4}$.

2. Solve the following equation using logarithms.

$$3 = 2^{x+1}$$

3. Solve for x. Round your solution to four decimal places.

$$3^x = 12$$

4. Solve for x. Round your solution to four decimal places.

$$(1+x)^3 = 5$$

5. Solve for x. Round your solution to four decimal places.

$$2\left(1+\frac{x}{12}\right)^{360} = 9.5$$

6. Use properties of logarithms to write the following expression using only a single log.

$$\log_2(5) + 3 \cdot \log_2(x)$$

7. Use properties of logarithms to write the following expression using only a single log.

$$\log(2) + \log(x) + \log(y) - \log(z)$$

8. Use properties of logarithms to write the following expression using only a single log.

$$\frac{1}{2}(\log(x) + \log(y)) - \log(z)$$