Review Exercises NAME:
College Algebra

These problems are examples of some of the prerequisite material for this class. We will spend little time on this material in class. If you are having difficulty, see me during my office hours or refer to the review material in your textbook.

1. The purpose of this question is to make sense of the rules of exponents. I find it is easier to think through the rules rather than relying on memorization.

The rules of exponents can be understood using the properties of real numbers such as the commutative and associative properties of multiplication (They are $a*b = b*a$ and $a(b*c) = (a*b)c$ for all real numbers a, b, and c.) as well as the basic ideas of exponentiation and arithmetic. For each of the rules listed below, use the given values for the variables and the properties of real numbers to help make sense of the rules. The first one is done for you.

Rule	**Specific values for variables**	**Expanded form**
$\frac{a^n}{a^m} = a^{n-m}$ where $a \neq 0$	$a = 2$, $n = 5$, $m = 3$	$\frac{2^5}{2^3} = \frac{2*2*2*2*2}{2*2*2} = \left(\frac{2*2*2}{2*2*2}\right)*\frac{2*2}{1} = 2*2 = 2^2 = 2^{5-3}$
$a^n a^m = a^{n+m}$	$a = 2$, $n = 5$, $m = 3$	
$\left(a^n\right)^m = a^{nm}$	$a = 4$, $n = 2$, $m = 3$	
$\left(ab\right)^n = a^n b^n$	$a = 2$, $b = 3$, $n = 3$	
$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ where $b \neq 0$	$a = 2$, $b = 3$, $n = 3$	

$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^{n}$ where $a \neq 0$, $b \neq 0$	$a = 2$, $b = 3$, $n = 1$	

2. There are two exponent rules that we will use quite a lot. I think of them as more notation than rules but they need to be memorized. They are $a^0 = 1$ and $a^{-n} = \frac{1}{a^n}$ (for any real numbers *a* and *n*, $a \neq 0$). Use these rules to simplify $\frac{7^0 * x^{-3}}{x}$.

3. Simplify the following. Write your answer with positive exponents. Remember the order of operations: parentheses, exponents, multiply and divide, add and subtract.

a.) $\frac{t^2 t^{-3}}{r^4 t}$

b.) $\left(\frac{m^2 y^0}{m y^2}\right)^3$

c.) $\left(\frac{a+b}{b^2}\right)^{-2}$

d.) $\left(\dfrac{r^4t^{-2}}{rt}\right)(t^2)^{-2}$

e.) $\left(\dfrac{3t}{12t^3}\right)^{-1} + 7t^2$

4. Factor the following.
a.) $x^2 - 6x - 7$

b.) $2t^2 - 13t + 15$

c.) $2x^2t - 2xt - 12t$

5. Perform the operation and simplify. Remember the order of operations: parentheses, exponents, multiply and divide, add and subtract.

a.) $4t^2 + 5t - 3 - (3t - 2)$

b.) $(3t - 2)(t + 4) - 2t^2 + 3$

c.) $4(x + 4)^2 - 3x^2$

d.) $5(t^2 + 3)^2 - 3(t - 2)$

6. Perform the operation and simplify. It helps to remember how to add, subtract, multiply, and divide ordinary fractions like $\frac{1}{2} + \frac{4}{5}$ or $\frac{3/2}{6/7}$; the rules are the same.

a.) $\frac{4x + 2}{x + 1} * \frac{5x^2}{3}$

b.) $\dfrac{3t^2-2}{t+3}+\dfrac{5t}{t+3}$

c.) $\dfrac{4r+5}{r+1}-\dfrac{3r^2}{2r+2}$

d.) $\dfrac{6t^2-1}{t+2}\div\dfrac{3t}{2t+1}$

7. All of the exponent rules in problem 1 hold true if the exponents are rational numbers or fractions. Use the rules to simplify the following.

a.) $\left(t^{4/5}t^{2/3}\right)^{1/3}$

b.) $\left(8x^2\right)^{1/3}$

c.) $\left(4r^3t^{1/2}\right)^{3/5}$

8. It happens to be true that $x^{1/2}$ is just another name for $\sqrt{x}$ and $x^{1/3}$ is another name for $\sqrt[3]{x}$. In general remember that $x^{1/n} = \sqrt[n]{x}$ where n is a positive integer. To investigate this further, rewrite the expressions below with rational exponents. Simplify exponents as needed.

a.) $\sqrt[3]{30} * \sqrt{10}$

b.) $\left(\sqrt[3]{45}\right)^2$

c.) $\sqrt[5]{42} - \dfrac{1}{\sqrt{35}}$