MATH 1030-04, Lecture Notes **Spring 2014**

1. More practice with exponents

   Examples:

   - $y^1 x^1 y^1 y^2 x^4 x^{-3}$
   - $y^2 x^3 z^4 x^2 z y^9$
   - $\frac{y^7}{y^{-3}}$
   - $\frac{xy^2}{x^{-2}y^2}$
   - $(x^6 y^2)^2$
   - $(x^{-2} y^4)^{-1}$
   - $\dfrac{yxxy}{(yx^2)^2}$

- $\dfrac{x(yxx^2)^3}{(y^3x^{-1})^{-2}}$

2. Order of operations
   Algebraic operations should always be carried out in the following order:

   (a) ____________________

   (b) ____________________

   (c) ____________________

   (d) ____________________

   Examples: Simplify the following:

   - $-8 + \dfrac{3}{6}(1 + 3(5)^2 x)$

   - $4(9x^2 + 16x^2)^{1/2}$

   - $9 \times \dfrac{180 - (5-7)^{2(3)}3}{\left(\frac{6}{8}\right)}$

3. Solving linear equations

A *linear equation* in one variable is an equation that can be written in the form

$$Ax + B = 0$$

for A, B real numbers and A nonzero.

Examples: Which of the following are linear equations?

- $3x - 5 = 0$
- $x^2 + 2x - 4 = 0$
- $x = 2$
- $3(x+1) - 5 = \dfrac{\frac{1}{2}}{6x - 7}$
- $3(x+1) - 5 = \dfrac{6x - \frac{1}{2}}{7}$
- $2(x+6)^2 - 5 = 0$

When one is presented with a linear equation (in one variable), it can always be solved using the following process:

(a) Collect all of the numbers on one side.
(b) Collect all instances of the variable we are solving for on the other side.
(c) Simplify.
(d) Divide out by our variable's coefficient.

Examples: Solve for x:

- $3x - 5 = 0$
- $3(x+1) - 5 = 8x$
- $\dfrac{7 - x}{7} = \dfrac{x}{3}$

4. Solving pairs of linear equations

Sometimes we are given two linear equations which use the same two variables. In this case we call the pair of equations a *system of equations*, and we can use the pair of equations to get numeric values for *both* variables.

Example: Solve the following system of equations:

$$3x + 5y = 2$$
$$3x + 9y = 12$$

Step 1. Solve for x in one of the two equations.

Step 2. Substitute what you found for x in the other equation.

Step 3. Solve the resulting linear equation using the steps described previously.

Step 4. In the equation found in Step 1, replace y with the above numerical value.