STA-O Basics for Entering Week 1

Enclosed is some information for you to get started on the material in Statistics.

       1. Brief Algebra Review
       2. Useful Web Resources to look over before the class
       3. A few tips

1. Brief Review covers the following:

       A. Fractions
       B. Square Roots
       C. Exponents
       D. Slope of a Line and Graphing
       E. The Exponential Function (e^x)

A. Fractions:

Fractions are always reduced to their lowest form. For the following exercises, solve for x.

1. $\dfrac{1}{2} = \dfrac{3}{x}$ x = _____

2. $\dfrac{1}{4} = \dfrac{8}{x}$ x = _____

3. $\dfrac{x}{200} = \dfrac{1}{5}$ x = _____

4. $\dfrac{x}{49} = \dfrac{3}{7}$ x = _____

For the following exercises, perform the following operations involving fractions. Reduce if possible.

5. $\dfrac{2}{3} + \dfrac{1}{4} =$ _____	6. $\dfrac{1}{2} + \dfrac{4}{6} =$ _____
7. $\dfrac{1}{5} + \dfrac{3}{4} =$ _____	8. $\dfrac{2}{9} + \dfrac{4}{5} =$ _____

B. Square Roots

When finding a square root of some number n, you are performing the inverse operation of squaring n. Roots and exponents are similar to addition/subtraction and multiplication/division as they are inverse operations of each other.

Perfect squares are the squares of whole numbers.
> For example: 1 ($1\times1=1^2$), 4 ($2\times2=2^2$), 9 (3^2), 16 (4^2), and 25 (5^2) are the first 5 perfect squares.

For the following exercises, take the square root of the number under the radical (the $\sqrt{}$, or square root, symbol). Remember your order of operations.

1. $\sqrt{196}$ = _____

2. $\sqrt{121}$ = _____

3. $\sqrt{144}$ = _____

4. $\sqrt{100}$ = _____

C. Exponents
Review of Laws of Exponents -

- Product Rule: $\left(a^m\right)\left(a^n\right) = a^{m+n}$

- Quotient Rule: $\dfrac{\left(a^m\right)}{\left(a^n\right)} = a^{m-n}$

- Power Rule:
  - $\left(a^m\right)^n = a^{m*n}$
  - $\left(ab\right)^m = a^m b^m$
  - $\left(-ab\right)^m = \left(-1\right)^m a^m b^m$
  - $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$

- Zero Exponent Rule (byproduct of the Quotient Rule):
  - $a^0 = 1$

- Proof: $a^0 = \dfrac{a^n}{a^n} = a^{n-n} = 1$

- **Negative Exponent Rule:**
  - $a^{-m} = \dfrac{1}{a^m}$ or $a^m = \dfrac{1}{a^{-m}}$

For the following exercises, perform the following operations using the Rules of Exponents:

1. $\left(x^5\right)\left(x^6\right) =$	2. $\left(x^3\right)\left(x^7\right) =$
3. $\left(x^4\right)^2\left(x^9\right) =$	4. $(xy)^4 =$

### D. Slope of a Line and Graphing:

The Cartesian coordinate system is a positioning plane that consists of two axes (x-axis and y-axis) that intersect at 90 degree angles at a point called the *origin*. The system creates a 2-D plane that is split into four regions (quadrants). Plotting points require the use of *ordered pairs*.

An ordered pair is shown as (x,y) – where the x-coordinate (or value) always appears first, and the y-coordinate always appears second.

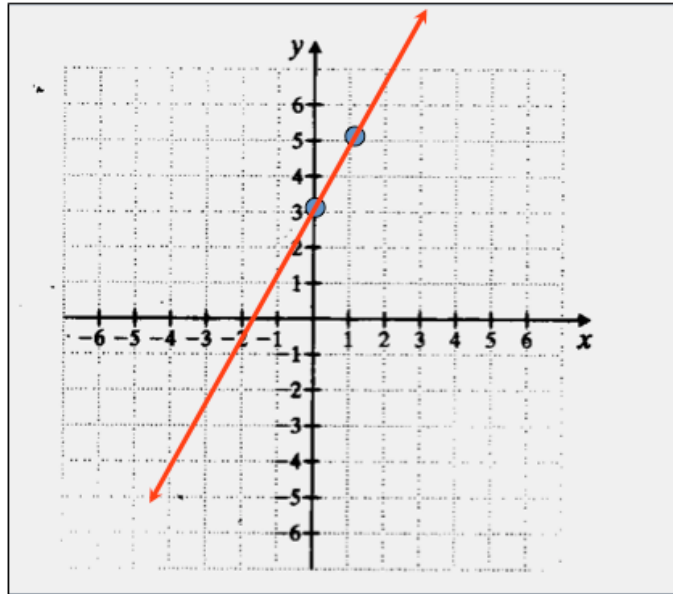Only two ordered pairs are necessary to graph a line.

Example: graph $y = x - 2$

x	y
0	-2
2	0
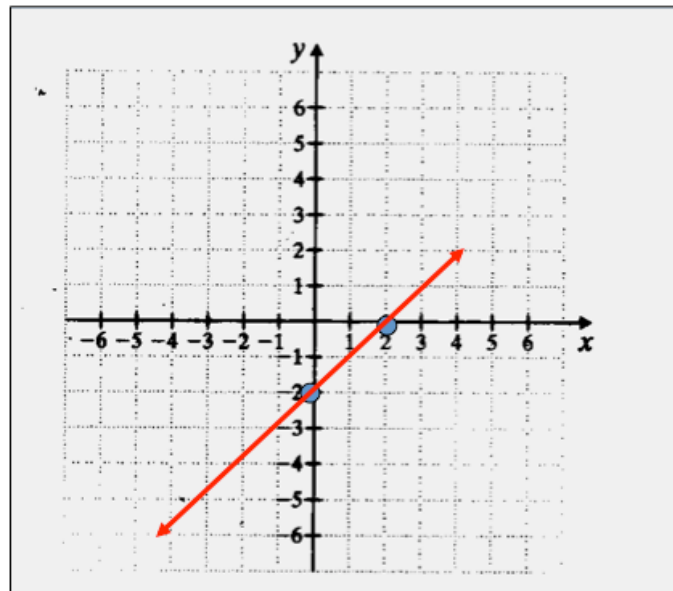
Example: graph $y = 2x + 3$

x	y
0	3
1	5

E. The Exponential Function (e^x)

The (natural) exponential function *e* is similar in some ways to the graphs of other types of functions. The main difference here is the base is mathematically constant, and will <u>always</u> be *e*, which has an approximate value of 2.718281828.

e will have a positive power (excluding the number 1). This function is primarily used to model constant change in the independent (x) variable. When systems grow exponentially and continuously at a rapid rate (e.g. population growth, interest), the growth is approximated using the natural exponential function.

We will be using the natural exponential function during the latter portion of this course. The standard rules of exponents apply to this function.

2. USEFUL WEB RESOURCES:
In addition to the Algebra Review, please go through some tutorials on Excel as linked below as you will be using the program in this course.

General Algebra Reviews:
Algebra @ Hippocampus.org – http://www.hippocampus.org/Algebra
Algebra Review in Ten Lessons –
http://www.math.uakron.edu/~dpstory/mpt_home.html
BAR (Basic Algebra Review) – http://www.pnc.edu/ssc/BARS.pdf

Office (Excel) Help:
Microsoft Office Help & How-To's:
   http://www.microsoft.com/mac/how-to?product=Excel&app=1
Excel Tutorial on Statistics – (this has a lot of neat info for using Excel)
   http://phoenix.phys.clemson.edu/tutorials/excel/stats.html
How to make a spreadsheet/table in Excel:
   http://www.wikihow.com/Make-a-Spreadsheet-in-Excel
   http://www.ehow.com/how_5074217_make-excel-spreadsheets.html
   http://www.ehow.com/video_4973233_make-table-excel.html (video)
How to make a graph in Excel:
   http://www.wikihow.com/Create-a-Graph-in-Excel
   http://www.ehow.com/how_4474239_make-graph-using-excel.html

3. Useful Tips:

   - Always work through examples in the reading and pay attention to bold terms and things defined in boxes

   - Read every chapter summary to pinpoint the most important information in that chapter

   - If you're uncertain how to proceed with a problem, do not hesitate to ask for assistance.

   - Make sure to read all the introductory resources, check your Announcements, view your References, and use the Course at a Glance as a study schedule guideline.