Initially, your plot should show the x-y data as a set of **unconnected** points. Look at the mathematical relationship as shown on the plot of density as a function of composition: is the relationship linear? If so, have Excel calculate and plot the equation of the best-fit line to the data. You now have an equation which relates density to volume percent alcohol. Given a value of volume per cent alcohol, the density can be calculated, or given a density (y-value), the corresponding volume per cent alcohol (the x-value) can be found from the equation of the line.

Using the equation of this line and the average measured density of whiskey and vodka from the class data, determine the volume percent ethanol of the whiskey and vodka, and calculate the percent relative error **compared to the accepted values listed on the whiskey and vodka bottles.** Percent relative error is given by eq 1.

$$PRE = \left| \frac{C_{expt} - C_{true}}{C_{true}} \right| x100 \qquad (1)$$

In equation 1, C_{expt} is the experimentally determined alcohol concentration and C_{true} is the alcohol concentration reported on the bottle.

Look closely at the plot which you have made: do all of the points lie directly on the best-fit line? Are there any outlying points which could be rejected from the data set? Comment on the 'scatter' of the points around the best-fit line in your discussion. Does the scatter appear to be random about the line, or is there a pattern to it? Is your calculated per cent alcohol in the whiskey and vodka in good agreement with the manufacturer's value? Is the fundamental assumption in this experiment (i.e. whiskey and vodka are made only of alcohol and water) valid? How do your data and your results lead you to support or reject this assumption?