Using GraphLab

Thank you for your interest in GraphLab, a program developed at UCLA to meet the needs of students who do not to know what to do with real scientific data, frequently their own, when they encounter it for the first time. The mathematics background our students have does not prepare them for data that contain errors. We use GraphLab in the first term of the General Chemistry laboratory; over 2000 students use the program each year.

We have successfully used the graphing exercise both as a pre-lab assignment and as an assessment tool. When we use it as a pre-lab exercise, which we prefer, we group the students in threes, have each student plot one of the sets of data and then have another one in the group review the first student's graph. The work is then collected; the instructor peruses the difficulties that the students have mentioned, and then leads a class discussion on the features of a well-scaled set of scientific data. The Scaling exercise in the GraphLab program follows logically from this discussion.

GraphLab consists of four separate lessons: Scaling, Best Fit, Errors, and Least Squares Fit.

Scaling

The criteria we are looking for in the scale are (1) linearity across the full range of the plot, (2) inclusion of all the data points, and (3) use of 75% of the plot area with no more than one of the axes being one of the data points.

An updated version of the program will have a set of exercises that require students to plot data which has a change in exponent when it is put in standard notation.

Best Fit

The line students must draw by eye in this section must have (1) a slope within 5% of the slope of the least-squares line, (2) be placed within ten pixels of the center point on the least-squares line, and (3) be at least 90% of the length of the least-squares-fit line.

Errors

The lines in this section conform to the criteria in "Best Fit" In addition, the designation of random or systematic error is determined by whether the line students draw agrees within 5% of the theoretical line that fits the function which is given.

Least Squares Fit

The criteria here also conform to the criteria in "Best Fit"

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