CALCULUS OF A VASE PROJECT

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The purpose of this project is to use calculus to find the volume, surface area, and arc length of an actual vase.

<u>The following tasks should be completed</u>:

- Devise a measurement technique to record and graph the dimensions of the vase. Use centimeters as the unit of measure.
- Translate your measurements into (x,y) coordinates. Plot these points on a coordinate plane with the use of technology (Excel, graphing calculator, etc…).
- Fit an appropriate curve to your points. Use the regression analysis feature of your graphing calculator or Excel. Discuss how good a fit your curve is to the data. (You may want to split the points into two or more curves in order to get a very good fit.)
- Use calculus to find the volume, surface area, and arc length of your vase. You may complete the integration by hand or using technology (graphing calculator or Maple).
- Measure as accurately as possible the volume of the physical vase and the arc length.
- Compute the error of your volume and arc length results, using:

  Percentage Error = (Actual – Experimental)/Actual * 100

<u>You should submit the following</u>:

A lab report that is a narrative description of how you executed the above steps. It should be typed and demonstrate college-level writing. Be sure to include the following:

- A description of how you physically measured the vase.
- A tabular display of your data points.
- A graph of the data points and the curve you fit to the data.
- The calculus of finding the volume, surface area, and arc length (if you used technology, give the integrals and their answers).
- A description of how you measured the actual volume of the vase and the arc length and what those measurements were.
- Computation and analysis of error in the volume and arc length measurements.
- A summary that includes: how confident you are in your surface area computation (after observing your approximate errors in volume and arc length), what you think the contributing factors are to your error, and any improvements that could be have been made to reduce error.

One must learn by doing the thing, for though you think you know it,
you have no certainty until you try it. -Sophocles