Honors Calculus

Optimization Project (BONUS)

You must optimize a 3-dimensional container. Your container may be in the shape of a cylinder (a can), a rectangular prism (a box), or something different such as a cone or sphere. Your container should only have two measurements, such as a radius and height or a square-based prism (i.e., you only want to have two variables).

The following guidelines apply:

- The project must be done in teams of two or individually, no exceptions.
- You can either choose to maximize the container's volume (keeping the surface area constant) or minimize its surface area (keeping the volume constant).
- You must use an actual container (empty is fine), measure its dimensions, and use those dimensions to calculate its surface area and volume. Do NOT use the volume specified on the packaging.

The project must include:

A colorful poster or digital presentation (PowerPoint, Prezi, or video presenting a poster) containing:

- A photograph (not just an image from the Internet) of the actual container, listing its dimensions
- Calculations of the container's surface area and volume. Do NOT use the volume on the packaging.
- ALL of your work, including
  - the primary and secondary (constraint) equations
  - derivative of your primary equation
  - the optimized dimensions
  - sign-line analysis to show that the dimensions result in an optimized solution
- A graph (handmade or Desmos graph) of what you optimized (volume or surface area in terms of the radius), marking the optimized value, as well as the actual value based on the actual radius.
- A comparison of your results with the container's actual. In other words, if you chose to optimize the volume, then show:

$$\frac{Optimized\ volume - Actual\ volume}{Actual\ volume} \times 100\%$$

which shows the additional percentage of volume your optimized container holds. If you chose to optimize the surface area, then show:

$$\frac{Actual\ surface\ area - \ Optimized\ surface\ area}{Actual\ surface\ area} \times 100\%$$

which shows the reduced percentage of surface area your optimized container has.

.**Due:** Projects must be turned in by _____ at 8 AM. Do not turn in an unfinished project.

Points: The project will be worth 10 test points. Both people on a team will receive the same points.

- Accuracy and completeness. (8 points)
- Neatness and creativity of your project. (2 points)

This is an example of a poster project to give you an idea of the requirements. You can't use this can of corn for your object. If you are a remote learner, I recommend you create a PowerPoint or Prezi to present your project. If you choose a poster presentation, you need a video showing each requirement clearly.