ACTIVITY#3 – Volume by Slices – Math 151 – Calculus II – Spring 2021
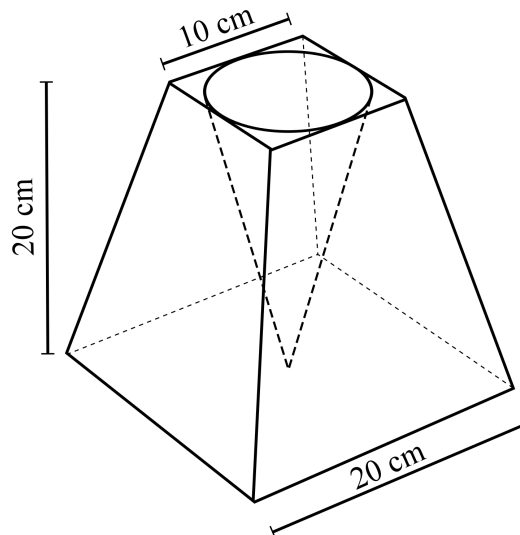
Professor/TA: _____   **Sec:** _____   **RedID:** _____

NAME (printed): _____   **Partners:** _____

(Family Name)   (First Name)

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Volumes: "The Pyramid Cup"

Consider the cup design to the right — it is a pyramid with the top chopped off and a cone bore out of the center.

• Take a few minutes to discuss possible strategies for calculating the volume of this object. List advantages and disadvantages for your strategy.

(1) Let's solve this problem using integration: draw a typical slice showing the **areas** that you will need to consider to form the volume by integration.

(2) Now, orient the structure showing the **side view** of the pyramid (the square top and bottom should not be visible).

(3) Now let's find formulas for our geometric shapes in the "slice" area from (1). Relate the area figure to the side view plot. The formulas should relate lengths, heights, widths, radii, etc. from the area figure to linear functions in the side view plot.

(4) Write down the formula for the area for each "slice." The total area formula should have the form

$$A_{\text{total}} = A_{\text{outer}} - A_{\text{inner}}.$$

(5) Write down an integral, which uses the areas in (1), for the volume of the pyramid cup. Be careful to identify if you are integrating over x or y, and include the bounds of integration.

(6) Compute the integral.