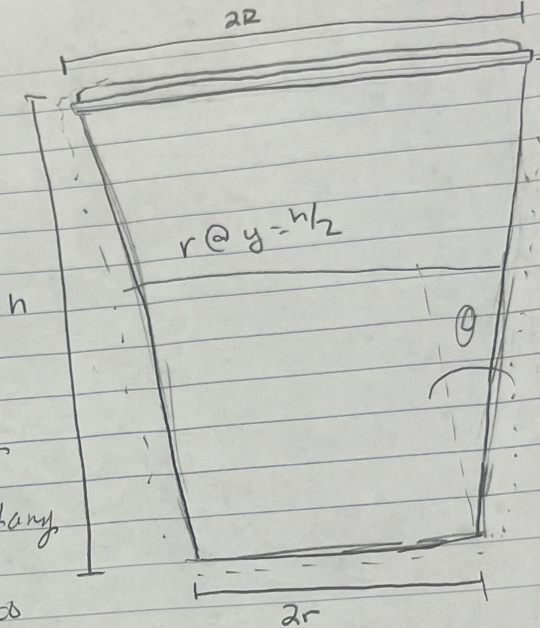
my radius of both top and bottom along with the height will be controlled by the parameters.

Steps I take

First I lofted my cup and extruded/lofted my lid.



my cup would be a conical frustum

$$V = \frac{\pi h}{3}\left(r^2 + R^2 + rR\right)$$

This approach allowed me to directly control the top and bottom radii independently while maintaing a tapered geometry.

I converted my fluid ounces to cubic inches with

$$\text{Fluid Volume} = 1.804688 \times \frac{\text{Volume}_{oz}}{\text{fl.oz}}$$

To mantain a realistic cup taper, I defined an angle parameter which created the relationship,

$$R = r + h\tan(\text{Angle})$$

→ this connects the top & bottom radi through taper angle

Since the volume is a driving parameter, I rearranged the frustum volume equation to solve for height in terms of angle & V.

after mathmatical manipulation

$$V = \frac{\pi h}{3}\left(1.5^2 + \frac{h^2}{4}\tan^2\theta - \cancel{\frac{3h}{2}\tan\theta} + 1.5^2 + \frac{h^2}{4}\tan^2\theta + \cancel{\frac{3h}{2}\tan\theta} + 2.25 + \cancel{.75h\tan\theta} - \cancel{.75h\tan\theta} - \cancel{\frac{h^2}{4}\tan^2(\theta)}\right)$$

$$\text{So } V = 2.25\pi h + \frac{\pi h^3 \tan^2\theta}{12}$$

The innerbottom radius is defined

$$\text{Inner } R = 1.5\text{in} - \frac{\text{Height}}{2}\tan(\text{Angle})$$

to ensure top D remains under 3 inches, cup fits in cupholder, and geometry scales proportionally with height

$$\text{Outer}R = \text{Inner}R + \text{Height}\tan(\text{Angle})$$

2 additional parameters were
Wallthick = .1 in
Lipthick = .1 in
The cup body is hollowed using shell feature driven by Wall thickness and same goes for lid.