



# Homework Set 2

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# Problem 1

- The aerodynamic drag on a car is given by

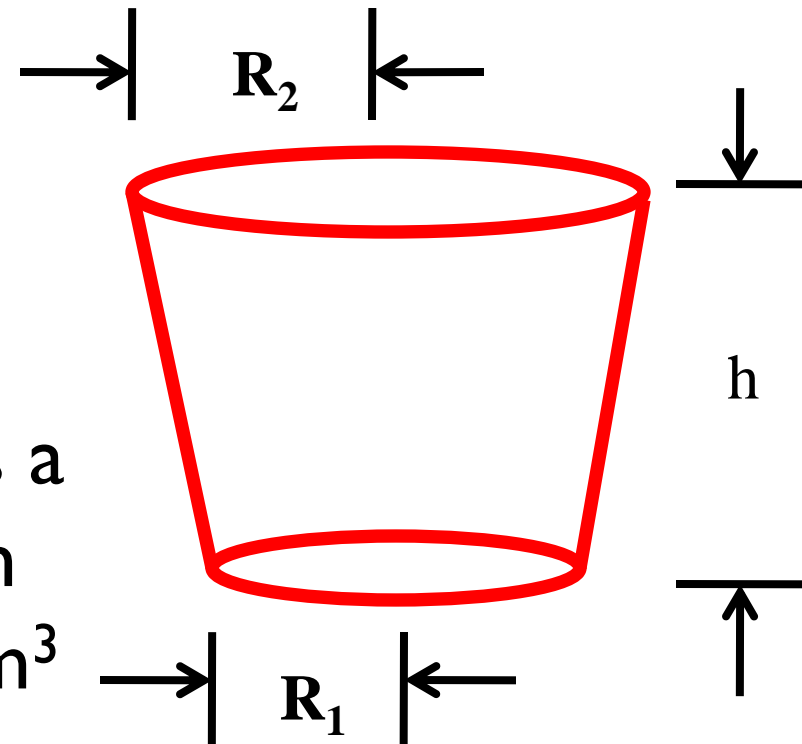
$$F_D = \frac{1}{2} \rho C_D A V^2$$

- $\rho$  is air density ( $1.2 \text{ kg/m}^3$ ),  $A$  is projected area, and  $V$  is velocity.
- Fit this data to the function to determine the product  $C_D A$

V (km/h)	20	40	60	80	100	120	140	160
$F_D$ (N)	10	50	109	180	300	420	565	771

## Problem 2

- A paper cup, shaped as a frustum of a cone, with  $R_2 = 1.3R_1$ , holds  $240 \text{ cm}^3$  of liquid. Determine  $R_1$  and  $h$  such that the amount of paper needed to make the cup is a minimum.



# Problem 3

- Fit the US Census data from 1900 to 2000 to an 8<sup>th</sup> order polynomial.
- When does this approach predict the US population will reach zero!