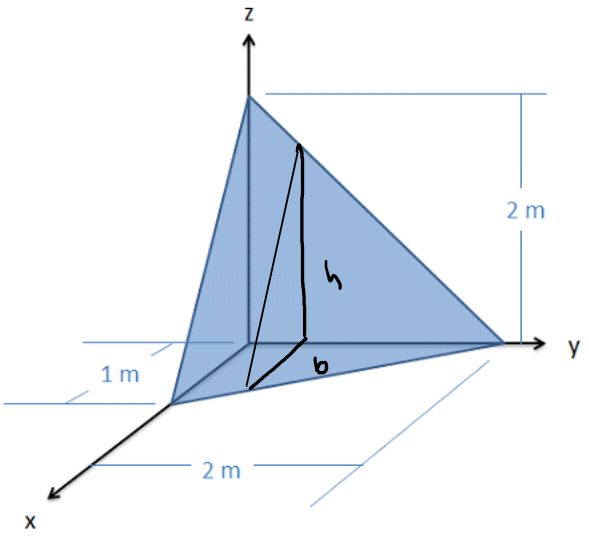
Question 2

Find the y coordinate of the centroid for the tetrahedron shown in the image below. (The fourth vertex is at the origin)



$$\bar{y} = \frac{\int_{y_{min}}^{y_{max}} (dV)(y)}{V} = \frac{\int_0^2 \left(\frac{1}{2}bh\right) d_y (y)}{\frac{1}{6}bhw}$$

$$b = -\frac{1}{2}y + 1$$

$$h = -y + 2$$

$$\bar{y} = \frac{\int_0^2 \left(\frac{1}{2}\left(-\frac{1}{2}y+\right)(-y+2)(y)\right) dy}{\frac{1}{6}(2)(2)(1)} = \frac{\int_0^2 \frac{1}{4}y^3 - y^2 + y}{\left(\frac{2}{3}\right)}$$

$$\bar{y} = \frac{\left|_0^2 \frac{1}{16}y^4 - \frac{1}{3}y^3 + \frac{1}{2}y^2\right.}{\left(\frac{2}{3}\right)} = \frac{.333}{.666} = \boxed{.5\,m}$$