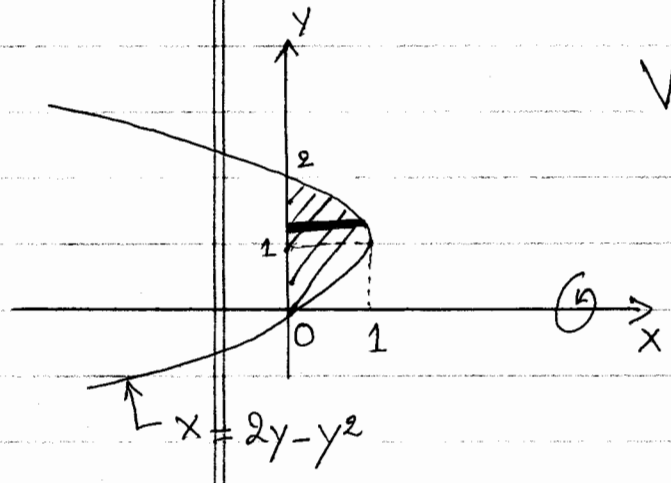
Math 102 Quiz 3 23/02/2013

Ex1. Use the Shell method to find the volume of the solid generated by revolving the region bounded by the curve $x = 2y - y^2$ and the line $x = 0$ about the x-axis.

Solution



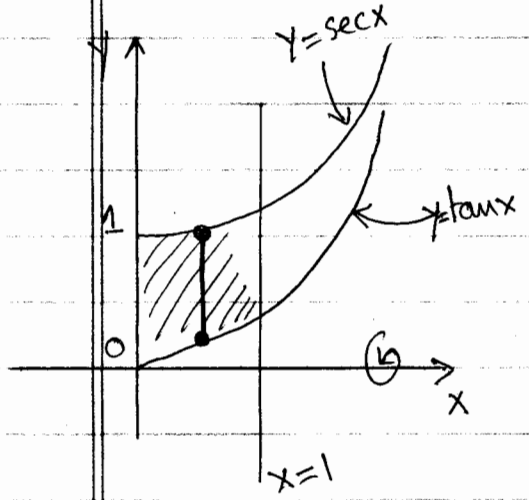
The shell radius

$$V = \int_0^2 2\pi \cdot \underbrace{y}_{\text{The shell radius}} \cdot \underbrace{(2y - y^2)}_{\text{The shell length}} \, dy$$

$$= 2\pi \int_0^2 (2y^2 - y^3) \, dy$$

$$= 2\pi \left[\frac{2}{3} y^3 - \frac{y^4}{4} \right]_0^2 = \frac{8}{3}\pi$$

Ex2 Use the Washer Method to find the volume of the solid generated by revolving the region bounded by $y = \sec x$, $y = \tan x$, $x = 0$, $x = 1$ about the x-axis.



$$V = \int_0^1 \pi \left[\underbrace{(\sec x)^2}_{\text{outer radius}} - \underbrace{(\tan x)^2}_{\text{inner radius}} \right] dx$$

$$= \int_0^1 \pi \, dx = \pi.$$