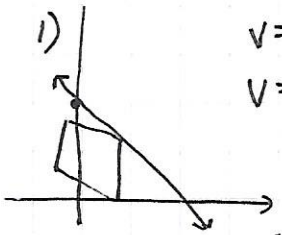
# Volumes w/ Known Cross Sections

1) 

$V = \int$ Area of Square

$V = \int_0^2 [-x+2]^2 dx$

$= \int_0^2 [x^2 - 4x + 4] dx$

$= \left[\frac{1}{3}x^3 - 2x^2 + 4x\right]\Big|_0^2$

$= \frac{8}{3} - 8 + 8$

$= \boxed{\frac{8}{3}}$

2) $V = \int_1^e (\ln x)^2 dx$

$= 0.718 \quad (A)$

3) $Y_1 = e^{-x^2} \quad Y_2 = 1 - \cos x$

$Y_1 = Y_2 \ @ \ x = 0.941 \rightarrow A$

$V = \int_0^A [Y_1 - Y_2]^2 dx$

$= 0.461$

4) $Y_1 = \sqrt{x} \quad Y_2 = e^{-3x}$

$Y_1 = Y_2 \ @ \ x = 0.238 \rightarrow A$

$V = \int$ Area of Rectangle

$V = \int_A^1 b \cdot h \, dx$

$b = Y_1 - Y_2 \quad h = 5b$

$\boxed{V = 1.554}$

5) $y = \sin^{-1} x$

$x = \sin y \quad x = 1$

$\sin y = 1$

$y = \frac{\pi}{2}$

$V = \frac{1}{2}\pi \int_0^{\pi/2} R^2 dy$

$R = \frac{1 - \sin y}{2}$

$V = \frac{\pi}{8} \int_0^{\pi/2} (1 - \sin y)^2 dy = 0.139$

6) $Y_1 = 2 + \sin x$, $y = 0$, $x = 0$, $x = \frac{3\pi}{2} \rightarrow A$

a) $V = \int_0^{3\pi/2} (2 + \sin x)^2 dx = 25.206 \rightarrow S$

b) $V = \int_0^A 3(Y_1)^2 dx = 3S = 75.617$

c) $V = \frac{\sqrt{3}}{4} \int_0^A (Y_1)^2 dx = \frac{\sqrt{3}}{4} S = 10.914$

d) $V = \frac{1}{2} \int_0^A (Y_1)^2 dx = \frac{1}{2} S = 12.602$

e) $V = \frac{1}{4} \int_0^A (Y_1)^2 dx = \frac{1}{4} S = 6.301$

f) $V = \frac{\pi}{8} \int_0^A (Y_1)^2 dx = \frac{\pi}{8} S = 9.898$

g) $V = \frac{\pi}{4} \int_0^A (Y_1)^2 dx = \frac{\pi}{4} S = 19.797$