1) $-a < x < \frac{1}{3}a$

because $3x-a$ negative

and $\cos(0.5x)$ positive

$$A = -\int_{-a}^{\frac{1}{3}a} \underset{u}{(3x-a)} \underset{dv}{\cos 0.5x}\,dx + \int_{\frac{1}{3}a}^{a} (3x-a)\cos 0.5x\,dx$$

$$= -\left[(3x-a)\times 2\sin 0.5x - 3\times 2\sin 0.5x\right]_{-a}^{\frac{1}{3}a}$$

$$+ \left[(3x-a)\times 2\sin 0.5x - 3\cdot 2\sin 0.5x\right]_{\frac{1}{3}a}^{a}$$

$$= -\left(0 - 6\sin(a/6) - 8a\sin 0.5a + 6\sin(0.5a)\right)$$

$$+ \left(4a\sin 0.5a - 6\sin 0.5a - 0 + 6\sin a/6\right)$$

$$= 12\sin a/6 - 4a\sin 0.5a$$

$$V = \pi\int y^2\,dx = \pi\int_{-1/6\,a}^{1/3\,a} \tan^2 x\,dx$$

$$= \pi\int_{a/6}^{a/3} (1+\sec^2 x)\,dx$$

$$= \pi\left[x + \tan x\right]_{a/6}^{a/3}$$

$$= \pi\left(\frac{a}{3} + \tan a/3\right) - \pi\left(a/6 + \tan a/6\right)$$

$$= \pi\left(a/6 + \tan a/3 - \tan a/6\right)$$