Becky Hudson / 12.1 IB math

Solids

P296 # 4

$$\frac{dV}{dt} = 2\pi(4t^2+4t+1) \qquad 0 \le t \le 12$$

$$V = \int 2\pi(4t^2+4t+1)\,dt$$

$$= 2\pi\left(\frac{4}{3}t^3+\frac{4}{2}t^2+t+C\right)$$

at $t=0$, $V=\pi$

$$V_0 = 2\pi\left(\frac{4}{3}(0)^3+2(0)^2+0+C\right) = \pi$$

$$C = \frac{1}{2}$$

$$V(t) = 2\pi\left(\frac{4}{3}t^3+2t^2+t+\frac{1}{2}\right)$$

$$V(3) = 2\pi\left(\frac{4}{3}(3)^3+2(3)^2+(3)+\frac{1}{2}\right)$$

$$= 2\pi\left(36+18+3+\frac{1}{2}\right)$$

$$V(3) = 115\pi$$