

② For part (b) you need the formula

$$V = \int \pi y^2 dx$$

i.e.  $V = \int_0^1 \pi (t - t^2)^2 dx$

$$= \pi \int_0^1 t^2 - 2t^3 + t^4 dx$$

you can't mix  $x$  and  $t$

$$= \pi \int_0^1 (t^2 - 2t^3 + t^4) \frac{dx}{dt} dt$$

$$= \pi \int_0^1 (t^2 - 2t^3 + t^4) 12t dt$$

$$= \pi \int_0^1 12t^3 - 24t^4 + 12t^5 dt$$

The limits are 0 and 1 because that's where  $y=0$   
 $t - t^2 = 0$   
 $t(1-t) = 0$   
 $\therefore t = 0, 1$

$$x = 6t^2$$

$$\frac{dx}{dt} = 12t$$

now integrate and substitute in  $t=0$  and  $t=1$