

- #5. Let C = desired tank capacity
 X = volume of weekly sales.

want

$$P\{X \geq c\} = 0.01.$$

But

$$P\{X \geq c\} = \int_c^1 5(1-x)^4 dx \quad (\text{if } 0 \leq c < 1)$$

$$= \int_0^{1-c} 5y^4 dy \quad (y=1-x)$$

$$= (1-c)^5.$$

$$\text{Set } (1-c)^5 = 0.01 \Rightarrow 1-c = 0.01^{1/5} \\ \Rightarrow \boxed{c = 1 - 0.01^{1/5}}$$

#6. (a) $EX = \int_0^\infty \frac{x^2}{4} e^{-x/2} dx = \frac{2}{4} \int_0^\infty y^2 e^{-y} dy \quad (y = \frac{x}{2})$

$$= \frac{2}{4} \Gamma(3) = \frac{2}{4} \times 2! = \boxed{1}.$$

(b) First find c :

$$\int_{-1}^1 c(1-x^2) dx = 1 \Rightarrow$$

$$c = \frac{1}{\int_{-1}^1 (1-x^2) dx} = \frac{1}{2 - \frac{2}{3}} = \frac{3}{4}.$$