6.

X: life in hours of a certain kind of radio tube

Density function:

$$f_x(y) = \begin{cases} 100/y^2, & y \geq 100 \\ 0, & y < 100 \end{cases}$$

a) $P(X \geq 250 \text{ hrs}) = ?$

$$\int_{250}^{\infty} \frac{100}{y^2}\, dy = -\frac{100}{y}\Big|_{250}^{\infty} = -\frac{100}{\infty} + \frac{100}{250} = 0.40$$

$\therefore P(X \geq 250) = 0.40$ or 40%

b) $E[X] = \int_{100}^{\infty} y \cdot f_x(y)\, dy = \int_{100}^{\infty} y \cdot \frac{100}{y^2}\, dy = \int_{100}^{\infty} \frac{100}{y}\, dy$

$= 100 \ln(y)\Big|_{100}^{\infty} = 100\ln(\infty) - 100\ln(100) = \infty$