Problema 15

$X \sim U(1800, 3000)$

a) $P(X > 2000) = \int_{2000}^{3000} \frac{1}{3000-1800} \, dx$

$= \frac{1}{1200} (3000-2000) = \frac{1000}{1200} = \frac{5}{6}$

$= 0'8\overset{\frown}{3}$

Observació:

$X \sim U(a,b)$

$f(x) = \frac{1}{b-a} \, \mathbb{1}_{(a,b)}(x)$

$$F(x) = P(X \leq x) = \begin{cases} 0 & x < a \\ \int_a^x \frac{1}{b-a} = \frac{x-a}{b-a} & a \leq x < b \\ 1 & x \geq b \end{cases}$$

$P(X > 2000) = 1 - P(X \leq 2000)$

$= 1 - F(2000) =$

$1 - \frac{(2000-1800)}{3000-1800} = 1 - \frac{200}{1200}$

$= \frac{1000}{1200}$

$$E(X) = \int_{1800}^{3000} x \cdot \frac{1}{1200} \, dx$$

$$= \frac{1}{1200} \left. \frac{x^2}{2} \right]_{1800}^{3000}$$

$$= \frac{1}{1200} \left(\frac{3000^2}{2} - \frac{1800^2}{2} \right)$$

$$= \frac{1800 + 3000}{2} = 2400$$

$$Var(X) = \frac{(b-a)^2}{12}$$

$$E(X) = \frac{a+b}{2}$$

$$Var(X) = E(X^2) - (E(X))^2$$

$$E(X^2) = \int_{1800}^{3000} x^2 \cdot \frac{1}{1200} \, dx$$

$$= \frac{1}{1200} \left. \frac{x^3}{3} \right]_{1800}^{3000}$$

$$= \frac{1}{1200} \left(\frac{3000^3}{3} - \frac{1800^3}{3} \right)$$

$$=$$

$$Var(X) = 120\,000$$