Lista 2

1) $\lambda = \quad \hat{\lambda} = \frac{n}{\sum_{i=1}^{n} t_i} = \frac{24}{23004} = 1{,}043 \cdot 10^{-3}$

2) $f(x) = \lambda x e^{-\frac{\lambda x^2}{2}}$

$$L(\lambda) = \prod_{i=1}^{n} f(x_i, \lambda) = \prod \left[\lambda^n \cdot x^n \cdot e^{-\frac{\lambda}{2}\sum_1^n (x^2)} \right]$$

$$\ln\left(\lambda^n \cdot x^n \cdot e^{-\frac{\lambda}{2}\sum_1^n (x^2)}\right)$$

$$\frac{\partial}{\partial \lambda}\left[n(\ln(\lambda)) + n(\ln(x)) + \frac{-\lambda}{2} \cdot \Sigma x^2\right] = \frac{n}{\lambda} + \sum_1^n x^2 \cdot \frac{-1}{2}$$

$$= \frac{n}{\lambda} + -\frac{\Sigma x^2}{2} = 0 \Rightarrow \frac{n}{\lambda} = \frac{\Sigma x^2}{2}$$

$$\Rightarrow \boxed{\lambda = \frac{2n}{\sum_1^n x^2}}$$

Verificando se é maximo

$$\frac{\partial}{\partial \lambda} \frac{n \cdot \lambda^0}{\lambda} + \sum_1^n x^2 \cdot \frac{-1}{2} = \frac{-n}{\lambda^2}$$

Como é negativo é ponto de máximo

3) $f(\tau) = \frac{1}{\lambda} \cdot e^{-\lambda^2 \tau}$

$$L(\tau) = \prod_{i=1}^{n} f(\lambda, \tau) = \left(\lambda^{-m} \cdot e^{-\lambda^2 \cdot \Sigma \tau} \right)$$

aplicando o ln

$$\ln = (-m \ln \lambda) + (\lambda^2 \cdot \Sigma t)$$

derivando e igualando a zero:

$$\frac{\partial}{\partial \lambda}\left[-m \ln \lambda + -\lambda^2 \Sigma \tau \right] = \frac{-m}{\lambda} - 2\lambda \Sigma \tau = 0$$

$$2\lambda \Sigma \tau = \frac{-m}{\lambda} \rightarrow \lambda^2 = \frac{-m}{2\Sigma \tau} \rightarrow \lambda = \sqrt{\frac{-m}{2\Sigma \tau}}$$ → 999

4) $f(x) = \lambda^x (5 - 2\lambda)^{1-2x}$

$$L(x) = \lambda^{xm} \cdot (5 - 2\lambda)^{(1-2x)m}$$

$$\ln = xm \ln \lambda + (m - 2xm) \ln (5 - 2\lambda)$$

$$\frac{\partial}{\partial \lambda}[\ln] = \frac{xm}{\lambda} - \frac{2(m - 2xm)}{(5 - 2\lambda)} = 0 \rightarrow \frac{xm}{\lambda} = \frac{2m - 4xm}{5 - 2\lambda}$$

$$\frac{5xm - 2\lambda xm - 2m\lambda + 4x\lambda m}{(\lambda) \cdot (5 - 2\lambda)} = 0 \rightarrow 5xm - 2\lambda xm - 2m\lambda + 4x\lambda m = 0$$

$$2\lambda xm - 2\lambda m = -5xm$$

$$\lambda(2xm - 2m) = -5xm$$

$$\lambda = -\frac{5xm}{2xm - 2m}$$

$$\lambda = \frac{-5x}{2x - 2}$$

5) a) $\lambda = h(t) =$ Taxa de falhas

$$\lambda = \frac{n}{\sum_{i=1}^{n} T_i} = \frac{6}{396} = 0,015\,1515 \approx 1.515.10^{-2}$$

b) $MTTF = \frac{1}{\lambda} \approx 66$ mil horas de uso

c) $R = e^{-\lambda T}$ para $T = 300 =$ [illegible] $\approx$ [illegible]

$R = e^{-1,51515} = 0,21978$