①

$f(x) = \ln(3{,}01) + (1{,}42 - \cos(1{,}56))\,x^2$

$a = 3{,}01 \qquad \Delta a = 0{,}5 \times 10^{-2} = \Delta b = \Delta c$

$b = 1{,}42$

$c = 1{,}56$

$f(a,b,c) = \ln(a) + (b - \cos(c))\,2{,}14 = \ln a + 2{,}14\,b - 2{,}14\cos(c)$

$\frac{\partial f}{\partial a} = \frac{1}{a} \qquad \frac{\partial f}{\partial b} = 2{,}14^2 \qquad \frac{\partial f}{\partial c} = 2{,}14^2 \sin(c)$

$\Delta f = \frac{1}{a}\Delta a + 2{,}14\,\Delta b + 2{,}14 \sin c\ \Delta c$

$= \frac{1}{3{,}01} \times 0{,}5 \times 10^{-2} + 2{,}14^2 \times 0{,}5 \times 10^{-2} + 2{,}14^2 \times \sin 1{,}56 \times 0{,}5 \times 10^{-2}$

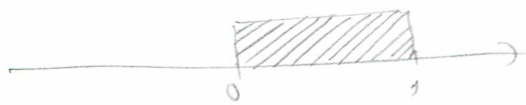
$= 0{,}047$

$f(2{,}14) = 7{,}556 \pm 0{,}047$

③

a) $x$ - v.a durabilidade

$x \sim N(20\,000;\ 2000)$




$Z \sim N(0,1)$

$P(X \leq 22000) = P\left(Z \leq \frac{22000 - 20000}{2000}\right) = P(Z \leq 1) = 0{,}8413$

b) $P(2000 < X < 22000) = P(0 < Z < 1) = P(Z \leq 1) - P(Z \leq 0)$

$= 0{,}8413 - 0{,}5 = 0{,}3413$

(9)

5% são defeituosos $\quad p = 0,05$

$n = 90$ (componentes)

↳ amostra

$\hat{p}$ - proporção de artigos c/ defeito

$$\hat{p} \sim N\left(0,05 ; \frac{0,0475}{90}\right)$$

$$Z \sim N(0,1)$$

$$P(\hat{p} < 0,055) = P\left(Z < \frac{0,055 - 0,05}{\sqrt{\frac{0,0475}{50}}}\right)$$

$$= P(Z < 0,22) = 0,5871$$