7.1) a) 99%

$$T = \frac{\bar{x} - \mu}{\frac{S}{\sqrt{m}}} \sim t_{m-1} \qquad S = 0.3906 \qquad \bar{x} = 2.2833$$

$\gamma = 0.99$ $\quad P(-\alpha \leq T \leq \alpha) = \gamma \iff \alpha = F_{t_a}^{-1}\left(\frac{1+\gamma}{2}\right) =$

$\alpha = 0.01$

$$\left[\bar{x} + \alpha \cdot \frac{S}{\sqrt{m}} \; ; \; \bar{x} - \alpha \cdot \frac{S}{\sqrt{m}}\right] = IAC_{99\%}(\mu)$$

$$\left[2.2833 + 0.3445 \; ; \; 2.2833 - 0.3445\right] = IAC_{99\%}(\mu)$$

b) $\gamma = 0.99$

$$Z = \frac{(m-1)S^2}{\sigma^2} \sim \chi^2_{(m-1)} \qquad P(a \leq Z \leq b) = \gamma \iff a = F_X^{-1}\left(\frac{1-\gamma}{2}\right) = 4.575$$

$$b = F_X^{-1}\left(\frac{1+\gamma}{2}\right) = 26.76$$

$$a \leq \frac{(m-1)S^2}{\sigma^2} \leq b$$

$$\frac{a}{(m-1)S^2} \leq \frac{1}{\sigma^2} \leq \frac{b}{(m-1)S^2} \iff \sqrt{\frac{(m-1)S^2}{a}} \geq \sigma \geq \sqrt{\frac{(m-1)S^2}{b}} \Rightarrow IAC_{99\%}(\sigma) = \left[0.2504 \; ; \; 0.6057\right]$$

7.2)

a) $X \sim Ber(p)$ $\qquad V = \bar{x}(1-\bar{x})$

$S = \sqrt{V}$

$$Z = \frac{\bar{x} - p}{\frac{S}{\sqrt{m}}} \overset{a}{\sim} N(0,1)$$

onde $a = \phi^{-1}\left(\frac{1+\gamma}{2}\right)$

$$P(-a \leq Z \leq a) \simeq \gamma \iff P\left(\bar{x} - a\sqrt{\frac{\bar{x}(1-\bar{x})}{m}} \leq p \leq \bar{x} + a\sqrt{\frac{\bar{x}(1-\bar{x})}{m}}\right) \simeq \gamma$$

$\gamma = 0.95$

$$IAC(p)_{95\%} = \left[0.17 - 1.96\sqrt{\frac{0.1411}{100}} \; ; \; 0.17 + 1.96\sqrt{\frac{0.1411}{100}}\right] = \left[0.09638 \; ; \; 0.2436\right]$$

b) $IAC(p)_{98\%} = \left[\bar{x} - a\sqrt{\frac{\bar{x}(1-\bar{x})}{m}} \; ; \; \bar{x} + a\sqrt{\frac{\bar{x}(1-\bar{x})}{m}}\right]$ $\qquad a\sqrt{\frac{p(1-p)}{m}} = 0.02$ $\qquad \phi^{-1}\left(\frac{1+0.98}{2}\right) = 2.3263$

$\rightarrow p_{max} = \frac{1}{2}$

$$\frac{p(1-p)}{\left(\frac{0.02}{2.0537}\right)^2} = m \Rightarrow m_{max} = 3383$$

Nº max 1ª tentativa de mais 3283 pessoas