

$$\textcircled{1} \text{ a) } P(X \leq 5) = P\left[Z \leq \frac{5-8}{2}\right] = P(Z \leq -1,5) = P(Z > 1,5)$$

$$= 1 - P(Z \leq 1,5) = 1 - 0,9332 = \boxed{0,0668}$$

$$\text{b) } P(X > 9,5) = P\left[Z > \frac{9,5-8}{2}\right] = P(Z > 0,75)$$

$$= 1 - P(Z \leq 0,75) = 1 - 0,7734 = \boxed{0,2266}$$

$$\text{c) } P(7 < X < 10) = P\left(\frac{7-8}{2} < Z < \frac{10-8}{2}\right) = P(-0,5 < Z < 1)$$

$$P(Z < 1) - P(Z < -0,5) = P(Z < 1) - P(Z > 0,5)$$

$$P(Z < 1) - [1 - P(Z \leq 0,5)] = 0,8413 - (1 - 0,6915)$$

$$= \boxed{0,5328}$$

$$\text{d) } P(X \geq K) = 0,75 \Rightarrow \Phi\left(\frac{K-8}{2}\right) = 0,75$$

$$P\left(Z < \frac{K-8}{2}\right) = 0,75 \Rightarrow \frac{K-8}{2} = 0,67$$

$$K - 8 = 1,34$$

$$\boxed{K = 9,34}$$

$$2) \quad \bar{x} = 1,80$$

$$\mu = 10 \text{ cm}$$

$$A) \quad x = 1,90$$

$$z = \frac{1,90 - 1,80}{0,1}$$

$$x = 1,90 = 0,5 - 0,3413 = \boxed{0,1587}$$

$$z = 1$$

$$A = 0,3413$$

$$b) \quad z = -0,52$$

$$-0,52 = \frac{x - 1,80}{0,10}$$

$$x = -0,52 \times 0,10 + 1,80$$

$$\boxed{x = 1,748}$$

③ A) $X \sim \text{Normal}(100, 100)$

$$P(X \leq a) = 95\%$$

$$P(X \leq a) = P\left(Z \leq \frac{a-100}{10}\right) = 0,95$$

$$\frac{a-100}{10} = 1,645$$

$$a = 116,45 \text{ m}^3/2$$

b) $P(88 \leq X \leq 110)$

$$P\left(\frac{88-100}{10} \leq Z \leq \frac{110-100}{10}\right) = P(-1,2 \leq Z \leq 1)$$

$$P(Z \leq 1) - P(Z \leq -1,2)$$

$$P(Z \leq 1) - [1 - P(Z \leq 1,2)] = 0,8413 - 1 + 0,8949$$

$$= 0,7262 = \boxed{72,62\%}$$

c) $P(\bar{X} > 110) = P\left(Z > \frac{110-100}{\frac{10}{\sqrt{6}}}\right)$

$$P(Z > 2,45)$$

$$1 - P(Z \leq 2,45)$$

$$1 - 0,9929 = 0,0071$$

$$= \approx \boxed{0,71\%}$$

$$\textcircled{4A) X - \text{Normal } (22,86; 0,0762^2)}$$

$$\text{Limites: } 22,86 \pm 0,127$$

$$= (22,733; 22,987)$$

$$P(22,733 < X < 22,987)$$

$$P\left(\frac{22,733 - 22,86}{0,762} < Z < \frac{22,987 - 22,86}{0,762}\right)$$

$$P(-1,67 < Z < 1,67)$$

$$P(Z < 1,67) - P(Z < -1,67)$$

$$P(Z < 1,67) - P(Z > 1,67)$$

$$P(Z < 1,67) - [1 - P(Z < 1,67)]$$

$$2 \cdot P(Z < 1,67) - 1$$

$$2 \cdot 0,9525 - 1 = 0,905$$

$$1 - 0,905 = 0,095 = \boxed{9,5\%}$$

$$b) P(22,733 < x < 22,987) = 0,99$$

$$P\left(\frac{22,733 - 22,86}{\sigma} < Z < \frac{22,987 - 22,86}{\sigma}\right) = 0,99$$

$$P\left(\frac{-0,127}{\sigma} < Z < \frac{0,127}{\sigma}\right) = 0,99$$

$$P\left(Z < \frac{0,127}{\sigma}\right) - P\left(Z < \frac{-0,127}{\sigma}\right) = 0,99$$

$$P\left(Z < \frac{0,127}{\sigma}\right) - P\left(Z > \frac{0,127}{\sigma}\right) = 0,99$$

$$P\left(Z < \frac{0,127}{\sigma}\right) - \left[1 - P\left(Z < \frac{0,127}{\sigma}\right)\right] = 0,99$$

$$2P\left(Z < \frac{0,127}{\sigma}\right) - 1 = 0,99$$

$$P\left(Z < \frac{0,127}{\sigma}\right) = \frac{1 + 0,99}{2} = 0,995$$

$$\frac{0,127}{2,58} = \sigma$$

$$\sigma = 0,0492$$

③ a) $X \sim \text{Normal}(70; 4^2)$

$$P(62 < X < 72) = P\left(\frac{62-70}{4} < Z < \frac{72-70}{4}\right)$$

$$P(-2 < Z < 0,5) = P(Z < 0,5) - P(Z < -2)$$

$$P(Z < 0,5) + P(Z < -2) - 1 = 0,6915 - 0,9772 - 1$$

$$\boxed{0,6687}$$

b) $P(70-c < X < 70+c) = 0,95$

$$P\left(-\frac{c}{4} < Z < \frac{c}{4}\right) = P\left(Z < \frac{c}{4}\right) - P\left(Z < -\frac{c}{4}\right)$$

$$2P\left(Z < \frac{c}{4}\right) - 1 = 0,95$$

$$P\left(Z < \frac{c}{4}\right) = 0,975$$

$$\frac{c}{4} = 1,96$$

$$\boxed{c = 7,84}$$