1) $\sigma = 16$

$\alpha = 0{,}05$

$M = 80$

$n = 256$

$$M \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

$$80 \pm 1{,}96 \cdot \frac{16}{16} = 80 \pm 1{,}96$$

$[78{,}04;\ 81{,}96]$ доверительный интервал

2) $X = 6.9,\ 6.1,\ 6.2,\ 6.8,\ 7.5,\ 6.3,\ 6.4,\ 6.9,\ 6.7,\ 6.1$

$n = 10$

$\alpha = 0{,}05$

$$\bar{X} = \frac{1}{n} \sum_{i=1}^{n} x_i = 6{,}59$$

$$D = \frac{1}{n-1} \sum_{i=1}^{n} (x_i - \bar{x})^2 = 0{,}203$$

$\sigma = \sqrt{D} = 0{,}45$, $t_{\alpha/2} = 2{,}262$

$$\bar{X} \pm t_{\alpha/2} \frac{\sigma}{\sqrt{n}} = 6{,}59 \pm 2{,}262 \cdot \frac{0{,}45}{\sqrt{10}} = 6{,}59 \pm 0{,}32$$

$[6{,}27;\ 6{,}91]$ довер. интервал

3) $\mu_0 = 17$ мм

$\alpha = 0{,}05$

$n = 100$

$\mu = 17{,}5$

$D_0 = 4$ мм^2

$H_0 : \mu = \mu_0$

$H_1 : \mu > \mu_0$

$$\sigma = \frac{\sigma_0}{\sqrt{n}} = \frac{2}{10} = 0{,}2$$

$z_{\alpha/2} = 1{,}65$

$$z = \frac{\mu - \mu_0}{\sigma} = \frac{0{,}5}{0{,}2} = 2{,}5$$

$z > z_{\alpha/2} \Rightarrow$ Неверна гипотеза H_0 с довериг. вероятностью 0,95.

4) $\mu_0 = 200$

$n = 10$

$X = [202, 203, 199, 197, 195, 201, 200, 204, 194, 190]$

$H_0 : \mu = \mu_0$

$H_1 : \mu \neq \mu_0$

$\alpha = 0{,}01$

$\bar{X} = 198{,}5$

$D = 19{,}83$

$\sigma = 4{,}45$

$t_{\alpha/2} = 3{,}2498$

$$t = \frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}} = \frac{198{,}5 - 200}{4{,}45/\sqrt{10}} = -1{,}07$$

$|t| < t_{\alpha/2} \Rightarrow$ Гипотеза H_0 верна с довериг. вероятностью 0,99.