

CLT- Tasks results

Task. 2.

$$X \sim N(32.2, 0.3)$$

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

$$\text{a) } P(X \geq 32) = 1 - P(X < 32) = 1 - P\left(Z < \frac{32 - 32.2}{0.3}\right) = 1 - P(Z < -0.67) = 1 - 0.2514 = 0.7486$$

$$\text{b) } CLT: \mu_{\bar{X}} = \mu_{\bar{X}} = 32.2$$

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{0.3}{\sqrt{4}} = 0.15$$

$$\bar{X} \sim N(32.2, 0.15)$$

$$P(\bar{X} \geq 32) = 1 - P(\bar{X} < 32) = 1 - P\left(Z < \frac{32 - 32.2}{0.15}\right) = 1 - P(Z < -1.33) = 1 - 0.0918 = 0.9082$$

Task. 3.

$$X \sim N(400, 60)$$

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

$$CLT: \mu_{\bar{X}} = \mu_{\bar{X}} = 400$$

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{60}{\sqrt{36}} = 10$$

$$\bar{X} \sim N(400, 10)$$

$$P(\bar{X} < 375) = P\left(Z < \frac{375 - 400}{10}\right) = P(Z < -2.5) = 0.0062$$