TD 5

Exercice 29:

1

$X \sim \mathcal{N}(200, 70^2)$

1

$\mathbb{P}(X > 250) = \mathbb{P}\big(\frac{X-200}{70} > \frac{5}{7}\big) = 1 - \mathbb{P}\big(\frac{X-200}{70} \leq \frac{5}{7}\big)$

$= 1 - \Phi\big(\frac{5}{7}\big)$

$\mathbb{P}(X \leq 180) = \mathbb{P}(X < 180) = \mathbb{P}\big(\frac{X-200}{70} < \frac{180-200}{70}\big) = \Phi\big(-\frac{2}{7}\big) = 1 - \Phi\big(\frac{2}{7}\big)$

2

$$\mathbb{P}(190 < X \leq 210) = \mathbb{P}\left(\frac{190-200}{70} < \frac{X-200}{70} \leq \frac{210-200}{70}\right) = \mathbb{P}\left(-\frac{1}{7} < \frac{X-200}{70} \leq \frac{1}{7}\right)$$

$$= \mathbb{P}\left(\frac{X-200}{70} \leq \frac{1}{7}\right) - \mathbb{P}\left(\frac{X-200}{70} \leq -\frac{1}{7}\right) = \Phi\left(\frac{1}{7}\right) - \Phi\left(-\frac{1}{7}\right) = 2\Phi\left(\frac{1}{7}\right) - 1$$

2

$X \sim \mathcal{N}(24, 3^2)$

1

$\mathbb{P}\big(\frac{X-24}{3} > \frac{x_4-24}{3}\big) = 0.05$ par table on a: $\frac{x_4-24}{3} = 1.65$ d'où x_4 = 28.95.

On trouve après grace aux équations: $(x_1 + x_4) = 24, x_1 + \frac{x_4-x_1}{3} = x_2, \ldots x_1 = 19.05, x_2 = 22.35, x_3 = 25.65$

2

On calcule $\mathbb{P}(X < x_1) = \mathbb{P}(X > x_4), \mathbb{P}(X \in [x_1, x_2]) = \mathbb{P}(X \in [x_3, x_4]), \mathbb{P}(X \in [x_2, x_3])$