

Question 2

Alice suffers from a thyroid disorder. The amount of antithyroid hormone in her blood is described by the following observations

1.

Let the number of sample be:

$$n = 14$$

Let the data in ascending order be:

$$x_1 = 0.11, \quad x_2 = 1.44, \quad \dots, \quad x_i, \quad \dots, \quad x_n = 10.8, \quad i \in \{1, 2, \dots, n\}$$

Then we have the mean:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i = \frac{2\,613}{700} \approx 3.733$$

Let the index of the median (i_{Q_2}), the index of the first quartile (i_{Q_1}) and the index of the third quartile (i_{Q_3}) be:

$$i_{Q_1} = \frac{n}{4} + \frac{1}{2} = 4$$

$$i_{Q_2} = \frac{n}{2} + \frac{1}{2} = 7.5$$

$$i_{Q_3} = \frac{3}{4}n + \frac{1}{2} = 11$$

Then we have the median (Q_2), the first quartile (Q_1) and the third quartile (Q_3):

$$Q_1 = \frac{x_{\lceil i_{Q_1} - \frac{1}{2} \rceil} + x_{\lfloor i_{Q_1} + \frac{1}{2} \rfloor}}{2} = x_4 = 2.6$$

$$Q_2 = \frac{x_{\lceil i_{Q_2} - \frac{1}{2} \rceil} + x_{\lfloor i_{Q_2} + \frac{1}{2} \rfloor}}{2} = \frac{x_7 + x_8}{2} = 3.615$$

$$Q_3 = \frac{x_{\lceil i_{Q_3} - \frac{1}{2} \rceil} + x_{\lfloor i_{Q_3} + \frac{1}{2} \rfloor}}{2} = x_{11} = 4.38$$

Answer

- $\bar{x} = \frac{2613}{700} \approx 3.733$
- $Q_2 = 3.615$
- $Q_1 = 2.6$
- $Q_3 = 4.38$

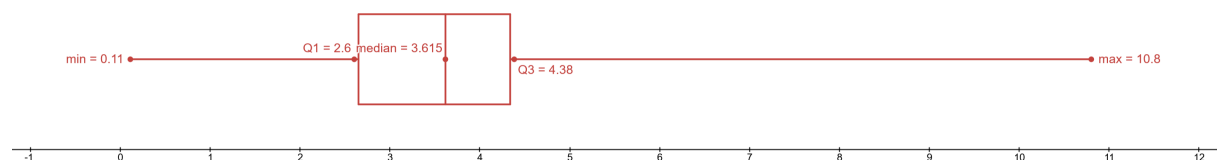
2.

Let the minimum (min) and the maximum (max) be:

$$\text{min} = x_1 = 0.11$$

$$\text{max} = x_n = 10.8$$

Then we have the boxplot:



Answer

