

(5) **Boxplot and quantiles**

Two novel randomized algorithms (A and B) are to be compared regarding their runtimes. Both algorithms were executed n times. The runtimes (in seconds) are stored in the file `algorithms.Rdata`

- (a) Set the working directory and load the data using `load()`. Create a boxplot to compare the running times. Color the boxes and add proper notations (axes notations, title etc.). More info via `?boxplot`
- (b) Comment on the following statements / questions only using the graphic
- (a) The first quartile of the times in A was about?
 - (b) the interquartile range of the times in B is about trice the interquartile range of A
 - (c) Is $n = 100$?
 - (d) More than half of the running times in B were faster than $3/4$ of the running times in A.
 - (e) At least 50% in A were faster than the 25% slowest in B.
 - (f) At least 60% in A were faster than the 25% slowest in B .

a) 20

b) for A: ≈ 12 for B: ≈ 24

c) can't tell

d) yes

e) yes

f) can't tell

(c) Regarding the runtimes

23.7, 13.7, 7.6, 9.0, 44.3, 3.5, 2.2, 34.2

which are a subset of B, find all empirical (a) medians, (b) first quartiles and (c) 2/3-quantiles (not using R).

2.2, 3.5, 7.6, 9.0, 13.7, 23.7, 34.2, 44.3

↑ ↑ ↑
first medians 2/3-quantile: 23.7
quartiles [9.0, 13.7]

[3.5, 7.6]

$$P(X < x) \leq \frac{1}{4}$$

$$P(X \leq x) \geq \frac{1}{4}$$