

Multivariate Normal and R

Exercise 1 IQ

Knowing that IQ is a normal measure of mean 100 and standard deviation 15, what is the probability of having an IQ

- more than 120?
- less than 100?

Exercise 2 Bias of the maximum likelihood estimator of the variance

Show that the maximum likelihood estimator of the variance is biased and propose an unbiased estimator.

Exercise 3 Fisher Iris Data

Consider the Fisher irises. Find flowers whose measured widths and lengths are exceptionally large or small.

Exercise 4 Equiprobability Ellipses

- Generate 1000 observation of a two-dimensional normal distribution $\mathcal{N}(\boldsymbol{\mu}, \Sigma)$ with
 - $\Sigma = \begin{pmatrix} 2 & 1 \\ 1 & 0.75 \end{pmatrix}$
 - $\boldsymbol{\mu}^t = (0, 0)$
- Draw the ellipses of equiprobability of the multiples of 5%.