

Exercise 1 — Model fitting

- * 1. Find the least-squares fit of a straight line to the points (1,2), (3,2), (4,3), (6,4) and (7,4).
- * 2. Find the least-squares fit of the same set of points to $y = ax^b$
- * 3. Using the method of least squares, find the best fit for a in the equation $y = ax^2$ with data points $(x_i, y_i), i = 1 \dots n$
- * 4. Given the model $z = ax + by$, Find a model fit for the data $(x, y, z) = \{(-2, -1, 2), (-1, 1, 1), (1, 1, 1)\}$
- ** 5. Explain how the model $y = \mathbf{b} \cdot \mathbf{x} + a$ can be fitted to a set of data using the matrix method.

Exercise 2 — Simultaneous Linear Equations

- * 1. Find the solution of the following set of equations via the a) inverse method, b) Gaussian elimination

$$\begin{aligned}x + 3y + z &= 2 \\x + y + 2z &= -1 \\2x + 3y + 4z &= 5\end{aligned}$$

- * 2. Explain how to determine whether a set of linear equations has no solution, one solution or multiple solutions.
- * 3. How many solutions does each of the following have?
 - a)

$$\begin{aligned}2x - 3y + 4z &= 8 \\3x + 2y + 6z &= 5 \\5x - y + 10z &= 4\end{aligned}$$

b)

$$\begin{aligned}2x - 3y + 4z &= 8 \\3x + 2y + 6z &= 5 \\5x - y + 10z &= 13\end{aligned}$$

c)

$$\begin{aligned}2x - 3y + 4z &= 8 \\3x + 2y + 5z &= 5 \\5x - y + 10z &= 13\end{aligned}$$