4.12 Exercises

1. Solve the following system of linear equations using Matlab/Octave, using any method you like:

$$\begin{aligned} 4x - 2y + 6z &= 8 \\ 2x + 8y + 2z &= 4 \\ 6x + 10y + 3z &= 0 \end{aligned}$$

2. Write code to generate the following matrix:

$$\begin{bmatrix} 3 & 0 & \cdots & 0 & 1 \\ 0 & 3 & \cdots & 0 & 2 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \cdots & 3 & 51 \\ 2 & 2 & \cdots & 2 & 52 \end{bmatrix}$$

   Its dimension should be 52×52. You do **not** need to generate it in one step / line of code.

3. Create a nonzero vector x of any dimension and verify using a conditional statement that the norm (length, in the geometric sense) of x, $\|x\|$ is equal to $\sqrt{x \cdot x}$ where $\cdot$ denotes the dot product.

4. Generate a 10×10 matrix full of floats (not just integers) in the interval $(0, 10)$, and then plot the mesh surface associated with your matrix.

5. Plot $e^{-\frac{1}{1-x^2}}$ over the interval $(-1, 1)$.