

Some Exercises in R

Try to write your own solutions where the dimension could be easily changed.

1. Create the matrix

$$\mathbf{X} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 3 & 9 \\ 1 & 5 & 25 \\ 1 & 7 & 49 \\ 1 & 9 & 81 \end{bmatrix}$$

2. Create the matrix

$$\mathbf{A} = \begin{bmatrix} 1 & -2 & 1 & 0 & 0 \\ 0 & 1 & -2 & 1 & 0 \\ 0 & 0 & 1 & -2 & 1 \end{bmatrix}$$

3. Create the matrix \mathbf{V} so that $(\mathbf{V})_{ij} = \exp(1 + |i - j|/8)$.

4. Create the matrix

$$\mathbf{J} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix}$$

5. Create the matrix

$$\mathbf{K} = \begin{bmatrix} 1 & 2 & 3 & 1 & 2 & 3 & 1 & 2 & 3 & 1 & 2 & 3 \\ 1 & 1 & 1 & 2 & 2 & 2 & 3 & 3 & 3 & 4 & 4 & 4 \end{bmatrix}$$