Name:

1. In this problem we represent a tiny 2×2 image by a vector $x = (x_1, x_2, x_3, x_4)$ of pixel intensities as follows:

x_1	x_3
x_2	x_4

a) Determine the matrix A such that the function $f(x) = Ax$ yields the image rotated by 90 degrees counterclockwise. That is, $f(x)$ should correspond to the image:

x_3	x_4
x_1	x_2

b) Determine the matrix A such that the function $f(x) = Ax$ yields the original image reflected left-right (as it would appear if viewed in a mirror).

2. Suppose the 4-vector c gives the coefficients of a cubic polynomial $p(t) = c_1 + c_2 t + c_3 t^2 + c_4 t^3$. Express the conditions

$$\begin{aligned} p(0) &= 1 \\ p(1) &= 2 \\ p'(0) &= -p'(1) \end{aligned}$$

as a set of linear equations of the form $Ac = b$. Give the sizes of A and b, as well as their entries.