Course 2E01 2018 (SF Engineers & MSISS & MEMS)

S h e e t 3

Due: at the end of the tutorial

Exercise 1

Use matrix multiplication to find:

(i) the image of the vector $(2, 3)$ under rotation through the angle $\frac{-\pi}{4}$ about the origin.

(ii) the image of the vector $(1, 2, -1)$ under rotation through the angle $\frac{\pi}{3}$ about z-axis.

(iii) the image of the vector $(1, 2, -1)$ under rotation through the angle $-\frac{\pi}{3}$ about y-axis.

Exercise 2

Determine which of the following are subspaces of $\mathbb{R}^3$:

(i) the set of all vectors of the form $(-a, 2a, b)$;

(ii) the set of all vectors of the form $(1, 0, -a)$;

(iii) the set of all vectors of the form $(b, a, -a + b)$.

Exercise 3

(i) Find parametric equations for the line spanned by the vector:

$$\mathbf{u} = (-1, -2, 1);$$

(ii) Give a system of linear equations that determines the line in (i).