MATE 4145 assignment 1

Upload a single pdf file for the hand exercises, and a diary file for each of the computer exercises. Write on each file your name and section. Note that in the Octave session, you can write text as comments (preceding with the % sign).

1–3. §2.1: 5, 7, 14.

4–7. §2.2: 1, 3, 4, 10.

8–10. §2.3: 8, 9, 26.

11–13. §2.4: 1, 2, 3.

Hints on exercises of §2.2: The general equation of a plane is

$$ax + by + cz = d \quad (1),$$

where not all of a, b, c, d are zero (we write $(a, b, c, d) \neq (0, 0, 0, 0)$). Finding an equation amounts to finding a, b, c, d, where $d = 0$ if the plane contains the origin (see p.27). In any event, the equation is never unique, as multiplying (1) by any nonzero number gives an equivalent equation.

For pb 1, use the form (2.2.3) p.27.

Pb 3: the plane in question has normal direction perpendicular to both vectors $(1, 0, 1)$ and $(2, -1, 2)$. That direction is given by the vector product of the two vectors.

Pb 4: if each equation is that of a plane containing the origin, the two planes must intersect at the given line. A first plane containing the given line (that is, containing the vector $\mathbf{u} = (1, 2, 1)$) is obtained by choosing any vector $\mathbf{v}$ not colinear with (i.e., not a multiple of) $\mathbf{u}$, and finding the vector product $\mathbf{u} \times \mathbf{v}$. That vector will be perpendicular to $\mathbf{u}$, so the plane having normal $\mathbf{u} \times \mathbf{v}$ and containing the origin will also contain $\mathbf{u}$. How do you find a second plane also containing $\mathbf{u}$?