

Math115 Test 5

March 4th, 2009

Answer all part of the question and give complete reasons and checks for your answers. The parts of the questions are weighted as shown in square brackets on the right.

1. (a) Determine a vector equation for the line L_1 which is $y = 3x - 2$. [1]
- (b) What is the vector equation and the standard equation for the line L_2 perpendicular to L_1 which passes through $\begin{pmatrix} 3 \\ 2 \end{pmatrix}$? [2]
- (c) Where does L_1 intersect L_2 ? [5]

2. We are given two planes as follows:

$$P_1 : \begin{pmatrix} x \\ y \\ z \end{pmatrix} \circ \begin{pmatrix} 5 \\ 2 \\ -1 \end{pmatrix} = -4, \quad P_2 : \begin{pmatrix} x \\ y \\ z \end{pmatrix} \circ \begin{pmatrix} 3 \\ 1 \\ 2 \end{pmatrix} = -5$$

- (a) Determine the line of intersection of P_1 and P_2 . [5]
- (b) Find where the line $L : \begin{pmatrix} -3 \\ 2 \\ 4 \end{pmatrix} + k \begin{pmatrix} 2 \\ -10 \\ 1 \end{pmatrix}$ intersects P_1 and P_2 . [4]
- (c) What is the distance from the origin to both of these points? Which is closer to the origin? How far are the two points apart? [3]