

Math1204 Assignment 5: Easter 2013

Answer all questions and give complete reasons and *checks* for your answers. Please do not erase anything, just put a line through your work and continue; you cannot lose marks for anything you write. The questions are weighted as shown and can be answered in any order. Because of everyone having different numbers, do not expect nice round numbers to come as your answers. Feel free to use Maple to assist you in your calculations, but do not use decimals to approximate.

The numbers represented by a , b and c should be replaced by the largest four digits of your registration number in decreasing order and any zero should be replaced by 1. For instance, if my registration number was 20005000 then i would take $a = 6$, $b = 2$ and $c = 1$.

Let P be the plane $\begin{pmatrix} x \\ y \\ z \end{pmatrix} \circ \begin{pmatrix} a \\ -3 \\ b \end{pmatrix} = 13$ and let L be the line $\begin{pmatrix} 4 \\ -1 \\ 2 \end{pmatrix} + \begin{pmatrix} 1 \\ 0 \\ -3 \end{pmatrix} t$.

1. Find the line of intersection between P and the plane Q which has equation

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} \circ \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix} = -4.$$

Does there exist a point with all coordinates as integers on your answer line? If so give it, if not explain why not. [5]

2. At which point does L intersect with P ? [3]

3. Find a vector equation for plane P and hence (or otherwise) explain in your own words

how to find the equation of a line E which passes through a point $F := \begin{pmatrix} -2 \\ c \\ -1 \end{pmatrix}$ but

does not intersect with P . Check if E intersects with L (no need to find the minimum distance between them). [5]

4. What are the shortest distances from F to P and F to L ? Which is F closest to? [7]