

Math1204 Test 5

March 22nd - 29th, 2012

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 parts of the questions are weighted as shown and can be answered in any order.

The numbers represented by a , b , c and d should be replaced by the last four digits of your registration number in that order and any zero should be replaced by -1 . For instance, if my registration number was 20015270 then i would take $a = 5$, $b = 2$, $c = 7$ and $d = -1$.

1. Find two different equations for the two dimensional line $y = dx + a$ in vector form. Use either vector form to find the point of intersection of that line with this one: [4]

$$L : \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -3 \\ 5 \end{pmatrix} \times t + \begin{pmatrix} c \\ 1 \end{pmatrix}$$

2. (a) Find the plane P which passes through the point $\begin{pmatrix} c \\ a \\ -5 \end{pmatrix}$ and has normal $\begin{pmatrix} -4 \\ b \\ 3 \end{pmatrix}$.
(b) In three dimensions, find the shortest distance from P to the point $N := \begin{pmatrix} 2 \\ -3 \\ -11 \end{pmatrix}$.
(c) Find a registration number nobody else in the class chooses which, if used in (a) to make P , would give you a plane which passes through N (or doesn't pass through N if your registration number gave a plane which did). [8]
3. Where does P intersect with this plane? [4]

$$Q : \begin{pmatrix} x \\ y \\ z \end{pmatrix} \circ \begin{pmatrix} 6 \\ -4 \\ 7 \end{pmatrix} = -5$$

4. Find two new points on P with integer values, find an equation of the unique line through them and verify that this line lies completely inside P . [4]