MAC 2313 (Multivariable Calculus) — Answers
QUIZ 3, Friday September 9, 2016

Name: **PID:**

Show your work. Remember that you won't get any credit if you do not show the steps to your answers.

1. [3] Find parametric equations for the line through the points $U(2,-2,3)$ and $V(3,-5,7)$.

The vector $\overrightarrow{UV} = \langle 3-2, -5-(-2), 7-3\rangle = \langle 1, -3, 4\rangle$ is parallel (0.5) to line. So parametric equations are, (by using U)

$x = 2+t,\quad y = -2-3t,\quad z = 3+4t,\quad -\infty < t < \infty$ (0.5 each)

Using V, one obtains: $x = 3+t,\ y = -5-3t,\ z = 7+4t,\ -\infty < t < \infty$

2. [4] Find an equation for the plane $\mathcal{P}$ containing the two lines: $L_1 : x = 2+5t,\quad y = 3-2t,\quad z = 4+t$ and $L_2 : x = 1-t,\quad y = 6+t,\quad z = 5+2t$.

$\vec{u_1} = \langle 5, -2, 1\rangle$ is parallel to L_1 0.5

$\vec{u_2} = \langle -1, 1, 2\rangle$ is parallel to L_2 0.5

$\vec{n} = \vec{u_1} \times \vec{u_2}$ = a normal to plane 0.5

$$= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 5 & -2 & 1 \\ -1 & 1 & 2 \end{vmatrix} = (-4-1)\vec{i} - (10+1)\vec{j} + (5-2)\vec{k}$$

$$= -5\vec{i} - 11\vec{j} + 3\vec{k}$$ 1

Setting $t=0$ in L_1 equations yields the point $A(2,3,4)$ 0.5

Equation for the plane: $-5(x-2) - 11(y-3) + 3(z-4) = 0$. 1

3. [3] Find the distance between the point $B(1,2,-3)$ and the plane $x - 3y + 5z = 8$

By the distance formula, (rewrite eqn of plane: $x - 3y + 5z - 8 = 0$)

$$D = \frac{|1(1) - 3(2) + 5(-3) - 8|}{\sqrt{1+9+25}}$$ ← 1.5 ← 1

$$= \frac{28}{\sqrt{35}}$$ 0.5