Math2210 Quiz 3 (Sections 11.4, 11.5, 11.6) Summer, 2010 Dylan Zwick

Name Solutions Date 7/15/2010

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. If $\boldsymbol{a} = \langle 2, 1, 3 \rangle$, $\boldsymbol{b} = \langle 0, 1, 2 \rangle$ and $\boldsymbol{c} = \langle -1, -2, 1 \rangle$.

(a) find $\boldsymbol{a} \times (\boldsymbol{b} + \boldsymbol{c})$.

$$\vec{b} + \vec{c} = \langle -1, -1, 3 \rangle$$

$$\vec{a} \times (\vec{b} + \vec{c}) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & 3 \\ -1 & -1 & 3 \end{vmatrix} = 6\hat{i} + (-9)\hat{j} + (-1)\hat{k}$$

$\boldsymbol{a} \times (\boldsymbol{b} + \boldsymbol{c}) =$ $6\hat{i} - 9\hat{j} - \hat{k}$

(b) find $\boldsymbol{a} \cdot (\boldsymbol{b} \times \boldsymbol{c})$

$$\vec{a} \cdot (\vec{b} \times \vec{c}) = \langle 2, 1, 3 \rangle \cdot \langle 5, -2, 1 \rangle = 10 - 2 + 3$$

$$= 11$$

$$\vec{b} \times \vec{c} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1 & 2 \\ -1 & -2 & 1 \end{vmatrix} = 5\hat{i} - 2\hat{j} + \hat{k}$$

$\boldsymbol{a} \cdot (\boldsymbol{b} \times \boldsymbol{c}) =$ 11

2. Find a parametric equation for the line perpendicular to both of the vectors $a=2i-3j+2k$ and $b=-3i+2j-k$ and that passes through the origin (0,0,0).

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & -3 & 2 \\ -3 & 2 & -1 \end{vmatrix} = -\hat{i} - 4\hat{j} - 5\hat{k}$$

$$x = -t$$
$$y = -4t$$
$$z = -5t$$

Answer 2: $x = -t,\ y = -4t,\ z = -5t$

3. Find the symmetric equations of the line through (4, 1, 3) and (1, -1, 0).

$$P = (4,1,3) \qquad Q = (1,-1,0)$$

$$\overrightarrow{PQ} = \langle 1-4, -1-1, 0-3 \rangle = \langle -3, -2, -3 \rangle$$

$$\frac{x-4}{-3} = \frac{y-1}{-2} = \frac{z-3}{-3}$$

Answer 3: $\frac{x-4}{-3} = \frac{y-1}{-2} = \frac{z-3}{-3}$