MA 126-E0 Summer 2006 Test 3

1. Let $\mathbf{F} = \mathbf{i} - 6\mathbf{j} + 3\mathbf{k}$, $\mathbf{G} = -3\mathbf{i} + 7\mathbf{k}$ and $\mathbf{H} = 2\mathbf{i} - 2\mathbf{j} + 5\mathbf{k}$. Compute each of the following, or explain why it is undefined.

(a) $\mathbf{F} \cdot \mathbf{H}$

(b) $\mathbf{G} \times \mathbf{H}$

(c) $|\mathbf{F}| \cdot \mathbf{G}$

(d) $\mathbf{F} \cdot (\mathbf{H} - \mathbf{G})$

(e) $\mathbf{F} \cdot (\mathbf{H} \times \mathbf{G})$

(f) $\frac{||\mathbf{H}||}{|\mathbf{F}|}\mathbf{G}$

(g) $(\mathbf{F} \cdot \mathbf{G} - \mathbf{H} \cdot \mathbf{G})\,|\mathbf{F} - \mathbf{H}|$

(h) $\mathbf{G} \times (\mathbf{F} \cdot \mathbf{G})$

2. Find the equation of the line determine by the points $(4, -2, 0)$ and $(3, -7, 2)$.

3. Find the equation of the plane containing the points $(-1, 1, 7)$, $(5, -2, 3)$ and $(4, 4, -8)$.

4. Suppose two lines L_1 and L_2 are given by symmetric equations

$$L_1 : \frac{x-2}{3} = \frac{y-3}{2} = \frac{z-2}{-1}$$

and

$$L_2 : \frac{x-2}{1} = \frac{y-6}{-1} = \frac{z+2}{3}.$$

Determine whether these lines intersect. If they do, find the point of intersection.

5. Let $\mathbf{F} = 3\mathbf{i} - 2\mathbf{j} - \mathbf{k}$ and $\mathbf{G} = \mathbf{i} + 4\mathbf{j} - 2\mathbf{k}$. Find

(a) $comp_{\mathbf{G}}\mathbf{F}$

(b) $proj_{\mathbf{G}}\mathbf{F}$