

MA3160

Quiz 2 - Summer 2007

10th July 2007

Closed Book/Notes

Name: Key

- 1.) Given $\vec{a} = 3\vec{i} + \vec{j} - \vec{k}$ and $\vec{b} = \vec{i} - 4\vec{j} + 2\vec{k}$, find $\vec{a} \times \vec{b}$. Use the algebraic method and show all key steps.

4

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} & \hat{i} & \hat{j} \\ 3 & 1 & -1 & 1 & -4 \\ 1 & -4 & 2 & 1 & -4 \end{vmatrix} = (2-4)\hat{i} + (-1-6)\hat{j} + (-12-1)\hat{k}$$
$$\vec{a} \times \vec{b} = -2\hat{i} - 7\hat{j} - 13\hat{k}$$

- 2.) Prove that $\vec{a} \times \vec{b} \perp \vec{a}$. Show all key steps. If $\vec{a} \times \vec{b} \perp \vec{a}$

2

then $(\vec{a} \times \vec{b}) \cdot \vec{a} = 0$.

$$(\vec{a} \times \vec{b}) \cdot \vec{a} = (-2)(3) + (-7)(1) + (-13)(-1)$$
$$= -13 + 13 = 0 \quad \checkmark$$

- 3.) Find the equation for a linear function with the given values.

$x \backslash y$	10	20	30	40
100	3	6	9	12
200	2	5	8	11
300	1	4	7	10
400	0	3	6	9

$$z = z_0 + m(x - x_0) + n(y - y_0)$$

$$m = \frac{\Delta z}{\Delta x} = \frac{-1}{100} \quad n = \frac{\Delta z}{\Delta y} = \frac{3}{10}$$

4

$$(x_0, y_0, z_0) = (400, 10, 0)$$

$$z = 0 + \frac{-1}{100}(x - 400) + \frac{3}{10}(y - 10)$$

$$z = -0.01x + 4 + 0.03y - 3 = -0.01x + 0.03y + 1$$