MATH 53

Quiz 2 – 07/09

Peter Koroteev

This is a closed book/notes test. Calculators are not permitted

1. Let $\mathbf{a} = 3\mathbf{i} + 2\mathbf{j} - \mathbf{k},\ \mathbf{b} = \mathbf{i} + \mathbf{j} - 2\mathbf{k},\ \mathbf{c} = \mathbf{i} + \mathbf{k}$.

   Calculate

   (a) $\mathbf{a} \cdot \mathbf{b}$

   (b) $\mathbf{c} \times \mathbf{a}$

   (c) $\mathbf{c} \times (\mathbf{a} \times \mathbf{b})$

   (d) $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c})$.

2. Given points $A = (1, 0, 1)$, $B = (2, 3, 0)$, $C = (-1, 1, 4)$ and $D = (0, 3, 2)$ find the volume of the parallelepiped with adjacent edges AB, AC and AD.

3. Find the values of x such that vectors $(3x, 2, x)$ and $(2, 4, x)$ are orthogonal.

4. Find parametric equation for the line passing through $(1, 0, -1)$ and $(1, 1, 5)$.

5. Find equation for the plane passing through $(3, -1, 1)$, $(4, 0, 2)$ and $(6, 3, 1)$.

6. **(Extra credit!)** Supposed $\mathbf{v}_1$ and $\mathbf{v}_2$ are vectors such that $|\mathbf{v}_1| = 2$, $|\mathbf{v}_2| = 3$ and $\mathbf{v}_1 \cdot \mathbf{v}_2 = 5$. Let $\mathbf{v}_3 = \text{proj}_{\mathbf{v}_1}\mathbf{v}_2$, $\mathbf{v}_4 = \text{proj}_{\mathbf{v}_2}\mathbf{v}_3$, $\mathbf{v}_5 = \text{proj}_{\mathbf{v}_3}\mathbf{v}_4$, etc.

   Compute $\sum_{n=1}^{\infty} |\mathbf{v}_n|$.