MATHEMATICS

Monday March 21 2016

Third Exercise Class

1) Given in $\mathbb{R}^3$ the vectors $\vec{v} = (1, 2, 3)$, $\vec{u} = (3, 2, 1)$, $\vec{w} = (2, 2, 2)$, calculate:

a) the combination $-3\vec{u} + \vec{v} + 4\vec{w}$

b) the inner product $\vec{u} \cdot \vec{w}$

c) the combination $\vec{u} \cdot \vec{v} \times \vec{u} - \vec{v} \cdot \vec{w} \times \vec{w}$

d) the vector $\frac{\vec{u}}{\|\vec{u}\|}$.

2) Given in $\mathbb{R}^4$ the vectors $\vec{v} = (3, 0, 1, -1)$, $\vec{u} = (0, 0, 3, 0)$, $\vec{w} = (1, 2, 3, -2)$ and $\vec{z} = (-1, -1, 2, 2)$, calculate

a) $\vec{u} + \vec{v}$

b) the length of each vector

c) $2\vec{u} - \vec{v} + \vec{w} + 4\vec{z}$

d) $\vec{w} - \vec{z}$

3) Given the vectors $\vec{v} = (-1, 0, 3)$, $\vec{w} = (2, -3, 6)$, $\vec{u} = (-2, 1, 2)$ find a, b and c in $\mathbb{R}$ such that $a\vec{v} + b\vec{w} + c\vec{u} = \vec{0}$.

4) Given the vectors $\vec{v} = (3, 4, -5)$ and $\vec{w} = (k, k - 1, 0)$ determine values for k such that their inner product is zero.

5) Given the vectors $\vec{v} = (1, -1, 1)$, $\vec{w} = (3, 2, -3)$, $\vec{u} = (0, \frac{1}{2}, 3)$ and $\vec{z} = (-1, -1, -1)$, find a, b and c such that $a\vec{v} + b\vec{w} + c\vec{u} = \vec{z}$

6) Given the following vectors, for each find the correspondent versor

a) $\vec{u} = (\alpha, -\alpha)$

b) $\vec{u} = (\alpha, 2\alpha, 3\alpha)$

c) $\vec{u} = (\alpha, 1 - \alpha, 2)$

d) $\vec{u} = \alpha(1, -1, 1, -1, 1)$