Assignment (1)

1) Let $\vec{a} = -\vec{\imath} + 3\vec{\jmath}$, $\vec{b} = 2\vec{\imath} + 3\vec{\jmath}$ and $\vec{c} = \vec{\imath} - 2\vec{\jmath}$ calculate the following $\vec{a} + \vec{b} + \vec{c}$, $2\vec{b} - 3\vec{a}$, $|\vec{a}|$, $|\vec{a} + \vec{b}|$, $|\vec{a}| + |\vec{b}|$
2) Find a unit vector in the same direction as $\vec{a} = 4\vec{\imath} - 2\vec{\jmath} + 4\vec{k}$
3) If the vectors $\vec{\imath} + 2\vec{\jmath} + \vec{k}$ and $-2\vec{\imath} + k\vec{\jmath} - 2\vec{k}$ are collinear, find the value of *k*.
4) When a particle is moved from the point (1, 1, 1) to (2, 1, 3) by a force $\lambda\vec{\imath} + \vec{\jmath} + \vec{k}$ where the work done is 4. Find the value of λ
5) Prove that the vectors $2\vec{\imath} - 2\vec{\jmath} + \vec{k}$, $\vec{\imath} + 2\vec{\jmath} + 2\vec{k}$ and $2\vec{\imath} + \vec{\jmath} - 2\vec{k}$ are perpendicular to each other.
6) Find the scalar product of the vectors $3\vec{\imath} + 4\vec{\jmath} - 5\vec{k}$, $2\vec{\imath} + \vec{\jmath} + \vec{k}$
7) Find a unit vector that is perpendicular to both $\vec{a}$ and $\vec{b}$ for

$$\vec{a} = 2\vec{\imath} + 7\vec{\jmath} - 4\vec{k} \quad , \quad \vec{b} = \vec{\imath} + \vec{\jmath} - \vec{k}$$

8) Show that $(\vec{a} + \vec{b}) \wedge (\vec{a} - \vec{b}) = 2\vec{b} \wedge \vec{a}$
9) Prove that $\vec{a} \wedge (\vec{b} \wedge \vec{c}) + \vec{b} \wedge (\vec{c} \wedge \vec{a}) + \vec{c} \wedge (\vec{a} \wedge \vec{b}) = 0$