PHYSICS 201
4^{th} HOMEWORK
Dr. V. Lempesis

Hand in: Tuesday 10^{th} of December 2013

Student Name : ____

Student ID: ____________________________

1. Let **u** = (4, 3, 2), **v** = (1, 4, 2), **w** = (1, 3, 2) . Show that a) $\mathbf{u}\cdot(\mathbf{u}+\mathbf{v})=0$ and b) $\mathbf{u}\times(\mathbf{v}\times\mathbf{w})=(\mathbf{u}\cdot\mathbf{w})\mathbf{v}-(\mathbf{u}\cdot\mathbf{v})\mathbf{w}$

2. Let **u** = (4, 3, 2), **v** = (1, 4, 2) find $\mathrm{Pr}\,oj_{\mathbf{v}}\mathbf{u}$ and $\mathbf{u}-\mathrm{Pr}\,oj_{\mathbf{v}}\mathbf{u}$.

3. Let $V=R^3=\{(a,b,c)\mid a,b,c\in R\}$. Check if the following subset of R^3 is a vector subspace: $W_2=\{(a,b,1)\mid a,b\in R\}$.

4. Consider the vector space

$$M_{2x3}=\left\{\begin{pmatrix} a & b & c \\ d & e & f \end{pmatrix} \mid a,b,c,d,e,f\in R\right\}.$$

Show that the vectors

$$e_1=\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix},\ e_2=\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix},\ e_3=\begin{pmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

$$e_4=\begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \end{pmatrix},\ e_5=\begin{pmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix},\ e_6=\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

are a base of the space.