DAWSON COLLEGE
Mathematics Department
Final Examination
Linear Algebra
201-NYC -05 Computer Science
May 25th, 2011

1.

10. (4+4+3 marks) Let $\vec{u} = (-1, 0, 3)$ and $\vec{v} = (2, 1, -4)$

    a) Find a unit vector perpendicular to both $\vec{u}$ ***and*** $\vec{v}$

    b) Find $\boldsymbol{Proj}_{\vec{u}+\vec{v}}(2\vec{u})$

    c) Find the area of the triangle determined by $\vec{u}$ and $\vec{v}$

11. (3 marks) Suppose $\vec{u} \cdot (\vec{v} \times \vec{w}) = 2$. Find $(3\vec{v} \times \vec{u}) \cdot 4\vec{w}$

12. (3 marks) Find $(3\vec{u} + 4\vec{v}) \times (2\vec{u} - \vec{v})$, if $\boldsymbol{u} \times \boldsymbol{v} = (-1, 2, \ 3)$

Answers

1. a) $\boldsymbol{x}_1 = 4 + \boldsymbol{t},\ \boldsymbol{x}_2 = 0\ \boldsymbol{x}_3 = 1 + 2\boldsymbol{t},\ \boldsymbol{x}_4 = \boldsymbol{t}.$ b) Ex.: $\boldsymbol{x}_1 = -4,\ \boldsymbol{x}_2 = 0,\ \boldsymbol{x}_3 = 1,\ \boldsymbol{x}_4 = 0.$

2. a) impossible; b) $4\boldsymbol{b}_1 + \boldsymbol{b}_2 + \boldsymbol{b}_3 = 0$; c) $4\boldsymbol{b}_1 + \boldsymbol{b}_2 + \boldsymbol{b}_3 \neq 0$

3. a) $\boldsymbol{A}^{-1} = \begin{bmatrix} 8 & -1 & 5 \\ 5 & -1 & 3 \\ 1 & 0 & 1 \end{bmatrix}$