Spring 2011  
ME-210 Applied Mathematics for ME  
Homework Assignment 6  
Due: Monday, April 25, 2011

IMPORTANT NOTES

- Neatness will be graded! In preparing your homework report, please refer to the ‘How to Submit a Successful HW Assignment’ section in the course web site.
- Show all your calculation steps and state any conclusions clearly.

1. For the vectors \( \vec{A} \), \( \vec{B} \) and \( \vec{C} \) the following information is given:
   \[ \vec{A} \cdot \vec{A} = 4 \quad \vec{B} \cdot \vec{B} = 4 \quad \vec{A} \cdot \vec{B} = 0 \quad (\vec{A} \times \vec{B}) \times \vec{C} = 0 \quad (\vec{A} \times \vec{B}) \cdot \vec{C} = 8 \]
   Find a) \( \vec{A} \cdot \vec{C} \) b) \( \vec{C} \) c) \( |\vec{B} \times \vec{C}| \)

2. If \( \vec{A} = 2\hat{i} - \hat{j} + 2\hat{k} \) and \( \vec{B} = \hat{i} + 2\hat{j} - 2\hat{k} \), find two vectors \( \vec{C} \) and \( \vec{D} \) satisfying all the following conditions: \( \vec{A} = \vec{C} + \vec{D} \), \( \vec{B} \cdot \vec{D} = 0 \), \( \vec{C} \) is parallel to \( \vec{B} \).

3. Supposing that \( \vec{A} \) and \( \vec{B} \) are orthonormal vectors (unit vectors perpendicular to each other) and that \( \vec{C} = a\vec{A} + b\vec{B} \), where \( a \) and \( b \) are not both zero, find the angle between \( \vec{B} \) and \( \vec{C} \).