Math 335-002 * Spring 2015
Homework #2
Due date: Thursday, February 5, 2015

Please show all work in detail to receive full credit

1. Simplify the following expression. Hint: use the BAC-CAB rule (see exercise 23 on page 50), and multiply the result by **a**. Bold letters indicate vectors.

$$((\mathbf{a} \times \mathbf{b}) \times \mathbf{b}) \times \mathbf{a}$$

2. Problem 24(b), page 50:
Show that $(\mathbf{u} \times \mathbf{v}) \bullet (\mathbf{u'} \times \mathbf{v'}) = (\mathbf{u} \bullet \mathbf{u'})(\mathbf{v} \bullet \mathbf{v'}) - (\mathbf{u} \bullet \mathbf{v'})(\mathbf{u'} \bullet \mathbf{v})$

Hint: you have to transform this expression twice: first, note that this can be viewed as a scalar triple product of three vectors, so you can use the cyclical property of the scalar triple product; then, use the BAC-CAB rule of triple vector product (see exercise 23 on page 50)

3. Problem 2, p. 58: Find the spherical coordinates of the Cartesian point $\left(\sqrt{6}, -\sqrt{2}, -2\sqrt{2}\right)$

4. Problem 7, page 59: describe and sketch the following surfaces, which are given in cylindrical or polar coordinates:

(a) $z = r^2$

(b) $\rho = 4 \csc \phi \sec \theta$

(c) $r = 4 \sin\theta$

(d) $\rho \sin \phi = 2$

Hint: this is much easier than this looks. In (b) and (d), convert each equation to Cartesian coordinates (x, y, z) to identify these very simple surfaces.