Homework for Sections 10.4–10.5

Mathematics 114, Section 2

due Monday, October 7

Read Sections 10.4–10.5 of the textbook.

1. **Section 10.4**: 2, 7, 16, 31, 36
2. **Section 10.5**: 8, 16, 23, 28, 41
3. Prove the formula mentioned in lecture for the magnitude of the cross product. That is, using the algebraic definitions of dot product

   $$\mathbf{u} \cdot \mathbf{v} = u_1 v_1 + u_2 v_2 + u_3 v_3$$

   and cross product

   $$\mathbf{u} \times \mathbf{v} = (u_2 v_3 - u_3 v_2)\hat{\mathbf{i}} + (u_3 v_1 - u_1 v_3)\hat{\mathbf{j}} + (u_1 v_2 - u_2 v_1)\hat{\mathbf{k}},$$

   derive the formula

   $$\big(\mathbf{u} \cdot \mathbf{v}\big)\big(\mathbf{u} \cdot \mathbf{v}\big) + \big(\mathbf{u} \times \mathbf{v}\big) \cdot \big(\mathbf{u} \times \mathbf{v}\big) = \big(\mathbf{u} \cdot \mathbf{u}\big)\big(\mathbf{v} \cdot \mathbf{v}\big)$$

Make sure you can do the core problems referred to on the web site. (10.4 — 3,6,31,37; 10.5 — 6,17,21,27,39).