Calculus III - Worksheet #2

1. Find the vector using the properties of cross product
   a. $(\boldsymbol{i} \times \boldsymbol{j}) \times \boldsymbol{k}$
   b. $(\boldsymbol{i} + \boldsymbol{j}) \times (\boldsymbol{i} - \boldsymbol{j})$

2. If $\boldsymbol{a} =< 1,0,1 >, \boldsymbol{b} =< 2,1,-1 >, and\ \boldsymbol{c} =< 0,1,3 >$,
   a. Find $\boldsymbol{a} \times (\boldsymbol{b} \times \boldsymbol{c})$
   b. Find $(\boldsymbol{a} \times \boldsymbol{b}) \times \boldsymbol{c}$
   c. Compare $\boldsymbol{a} \times (\boldsymbol{b} \times \boldsymbol{c})$ and $(\boldsymbol{a} \times \boldsymbol{b}) \times \boldsymbol{c}$, are they equal?

3. Find the area of the triangle $\boldsymbol{P}(\mathbf{0}, -\mathbf{2}, \mathbf{0}), \boldsymbol{Q}(\mathbf{4}, \mathbf{1}, -\mathbf{2})$ and $\boldsymbol{R}(\mathbf{5}, \mathbf{3}, \mathbf{1})$

4. Problem 39 from Section 12.4 on page 815

5. Show that $|\boldsymbol{a} \times \boldsymbol{b}|^{\mathbf{2}} = |\boldsymbol{a}|^{\mathbf{2}}|\boldsymbol{b}|^{\mathbf{2}} - (\boldsymbol{a}.\boldsymbol{b})^{\mathbf{2}}$

6. Problem 1 from Section 12.5

7. Find the parametric and symmetric equations for the line passing through $(2,1,0)$ and perpendicular to both $\boldsymbol{i} + \boldsymbol{j}$ and $\boldsymbol{j} + \boldsymbol{k}$.

8. Problems 21, 22.

9. Find the equation of the plane passing through $(1, -1,1)$ and contains the line of intersection of the planes $x + y - z = 2$ and $2x - y + 3z = 1$.

10. Problem 73 from section 12.5