

## Math 211 Cross Product Practice

1. You are looking at a map. A vector  $\mathbf{u}$  with  $\|\mathbf{u}\| = 8$  is pointing north on the map, and a vector  $\mathbf{v}$  with  $\|\mathbf{v}\| = 2$  is pointing northeast.
  - a. The crossproduct  $\mathbf{u} \times \mathbf{v}$  points in which direction?
  - b. What is the magnitude  $\|\mathbf{u} \times \mathbf{v}\|$  ?
  
2. If  $\mathbf{a} = \mathbf{i} + 9\mathbf{j} + \mathbf{k}$  and  $\mathbf{b} = \mathbf{i} + 18\mathbf{j} + \mathbf{k}$ , find a unit vector that is orthogonal to both  $\mathbf{a}$  and  $\mathbf{b}$  and that has a positive first coordinate.
  
  
  
  
  
  
  
  
  
  
  
  
  
  
3. Are the following statements true or false? Explain.
  - a. If  $\mathbf{v}$  and  $\mathbf{w}$  are any two vectors, then  $\|\mathbf{v} + \mathbf{w}\| = \|\mathbf{v}\| + \|\mathbf{w}\|$ .
  - b. The value of  $\mathbf{v} \cdot (\mathbf{v} \times \mathbf{w})$  is always zero.
  - c. For any scalar  $c$  and any vector  $\mathbf{v}$ , we have  $\|c\mathbf{v}\| = c\|\mathbf{v}\|$ .
  - d.  $(\mathbf{i} \times \mathbf{j}) \cdot \mathbf{k} = \mathbf{i} \cdot (\mathbf{j} \times \mathbf{k})$ .