CROSS PRODUCT

Find the cross product $\vec{u} \times \vec{v}$

1. $\vec{u} = 2\hat{i} + 3\hat{j} - 2\hat{k}$
   $\vec{v} = -4\hat{i} + 4\hat{j} + 3\hat{k}$

2. $\vec{u} = 4\hat{i} + 2\hat{j} + \hat{k}$
   $\vec{v} = -\hat{i} + 4\hat{j} - 2\hat{k}$

3. $\vec{u} = 2\hat{i} + 3\hat{j} - 2\hat{k}$
   $\vec{v} = 2\hat{i} + 3\hat{j} - 2\hat{k}$

4. $\vec{u} = 2\hat{i} + 3\hat{j} - 2\hat{k}$
   $\vec{v} = 4\hat{i} + 6\hat{j} - 4\hat{k}$

5. $\vec{u} = 2\hat{i} + 3\hat{j}$
   $\vec{v} = -4\hat{i} + 4\hat{j}$

6. $\vec{u} = 5\hat{i} + \hat{k}$
   $\vec{v} = 3\hat{i} + 2\hat{k}$

7. $\vec{u} = \hat{i}$
   $\vec{v} = \hat{j}$

8. $\vec{u} = \hat{j}$
   $\vec{v} = \hat{i}$

9. $\vec{u} = \hat{k}$
   $\vec{v} = \hat{i}$

10. $\vec{u} = \hat{i}$
    $\vec{v} = \hat{k}$

11. Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$, $\vec{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$, and $\vec{c} = c_1\hat{i} + c_2\hat{j} + c_3\hat{k}$. Then show by direct calculation that $\vec{a} \bullet (\vec{b} \times \vec{c}) = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix}$. (By the way, $\vec{a} \bullet (\vec{b} \times \vec{c})$ is known as a triple

scalar product, and $\left|\vec{a} \bullet (\vec{b} \times \vec{c})\right|$ is equal to the volume of the parallelepiped defined by the vectors $\vec{a}$, $\vec{b}$, and $\vec{c}$.