1) Find the angle between the vectors \( \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \) and \( \begin{bmatrix} -2 \\ 1 \\ -2 \end{bmatrix} \). Give an exact answer and an appropriate estimate.

2) Consider the triangle whose vertices are the points \((3, 1, 6), (1, 2, 3), \) and \((-4, -2, 5)\). Prove this triangle is a right triangle.

3) A human being pushes a cart up a ramp by exerting a horizontal force of 6 newtons on the cart. The ramp is 10 meters long and makes an angle of 15 degrees with the horizontal. Compute the amount of work performed by the human in pushing the cart from the bottom of the ramp to the top of the ramp. Give the exact answer and an appropriate estimate.

4) Prove: \( \mathbf{a} \times (\mathbf{b} \times \mathbf{c}) = (\mathbf{a} \cdot \mathbf{c}) \mathbf{b} - (\mathbf{a} \cdot \mathbf{b}) \mathbf{c} \).

5) Find the area of the triangle whose vertices are the points \((1, 2, 3), (0, 0, -4), \) and \((5, -2, 1)\).

6) Find all unit vectors orthogonal to both \( \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \) and \( \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} \).

7) Do the vectors \( \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix}, \begin{bmatrix} -2 \\ 8 \\ 15 \end{bmatrix} \) all lie in the same plane? Explain.