Calculus III Quiz 3 9/16/5

Name: Signature:

Show your work.

Question 1
Let \( \mathbf{A} = [2, 3, -1] \) and \( \mathbf{B} = [1, 2, 0] \) be points in space.

- Find the parametric and symmetric equations of the line \( \mathbf{AB} \).

- For which value of \( z \) does the point \( \mathbf{C} = [8, 9, z] \) lie on the line \( \mathbf{AB} \)?

- For that value of \( z \), what is the ordering of the three points \( \mathbf{A}, \mathbf{B} \) and \( \mathbf{C} \) along the line?
  Explain your answer.

Question 2
Let \( \mathbf{A} = [3, -5, -1] \), \( \mathbf{B} = [2, -6, -3] \) and \( \mathbf{C} = [-2, -1, -2] \).

- Find the parametric and non-parametric equations of the plane \( \mathbf{ABC} \).

- Find the area of the triangle \( \mathbf{ABC} \).

- Find the volume of the parallelopiped determined by the origin and the vectors \( \mathbf{A}, \mathbf{B} \) and \( \mathbf{C} \).

- Let \( \mathbf{D} = [-1, 3, 3] \).
  Show that the lines \( \mathbf{AB} \) and \( \mathbf{CD} \) meet and find their intersection point.