Name:

Student ID:

Math refresher

Answer the following questions about the above figure, where $V_1 = (x_1, y_1, z_1)$ and $V_2 = (x_2, y_2, z_2)$.

1. Find a vector $V$ that has the same direction as $V_1$ and unit length.
2. How would you calculate the angle between vectors $V_1$ and $V_2$?
3. How would you find a vector $V_3$ that is orthogonal to both $V_1$ and $V_2$?
4. Calculate the product $C = AB$, where

   $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 2 & 3 \end{bmatrix}$, \quad $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$.

5. Calculate $D = BA^T$, where $A$ and $B$ are as in Problem 4.