

$$\overline{AB} = \{B_x - A_x, B_y - A_y, B_z - A_z\} = \{2 - 1, 3 + 1, 3 - 1\} = \{1, 4, 3\}$$

$$\overline{BC} = \{C_x - B_x, C_y - B_y, C_z - B_z\} = \{3 - 2, 2 - 3, 1 - 4\} = \{1, -1, -3\}$$

$$\begin{aligned}\overline{AB} \times \overline{BC} &= \begin{vmatrix} i & j & k \\ AB_x & AB_y & AB_z \\ BC_x & BC_y & BC_z \end{vmatrix} = \begin{vmatrix} i & j & k \\ 1 & 4 & 3 \\ 1 & -1 & -3 \end{vmatrix} = \\ &= (-12 + 3)i - (-3 - 3)j + (-1 - 4)k = \{-9, 6, -5\}\end{aligned}$$