

Supplementary Exercises for Section 11.4

1. Find the area of the parallelogram with vertices $(0,0)$, $(1,2)$, $(3,7)$, and $(2,5)$.
2. Find, and explain the value of, $(\mathbf{i} \times \mathbf{j}) \times \mathbf{k}$ and $(\mathbf{i} + \mathbf{j}) \times (\mathbf{i} - \mathbf{j})$.
3. Prove that $\mathbf{x} \times (\mathbf{y} \times \mathbf{z}) = (\mathbf{x} \cdot \mathbf{z}) \mathbf{y} - (\mathbf{x} \cdot \mathbf{y}) \mathbf{z}$
4. We define the triple product of three vectors, \mathbf{x} , \mathbf{y} and \mathbf{z} to be the scalar $\mathbf{x} \cdot (\mathbf{y} \times \mathbf{z})$. Argue that if three vectors lie in the same plane, then their triple product is zero. Verify that $\langle 1, 5, -2 \rangle$, $\langle 4, 3, 0 \rangle$ and $\langle 6, 13, -4 \rangle$ are coplanar.