

MA 1111: Linear Algebra I
Tutorial problems, September 20, 2018

1. Given that the points $(1, 1)$, $(-1, -1)$, and $(0, 2)$ are three vertices of a parallelogram, find possible positions of its fourth vertex.
2. Compute the angle between the vectors $\mathbf{a} = (3, 5)$ and $\mathbf{b} = (2, 1)$.
3. (a) Compute the area of the parallelogram determined by the vectors $\mathbf{u} = (1, 2, 2)$ and $\mathbf{v} = (2, 3, 5)$. (b) Compute the volume of the parallelepiped determined by the vectors $\mathbf{u} = (1, 2, 2)$, $\mathbf{v} = (2, 3, 5)$, and $\mathbf{w} = (3, 0, 1)$.
4. If \mathbf{u} , \mathbf{v} , and \mathbf{w} are three-dimensional vectors, is the expression $\mathbf{u} \times (\mathbf{v} \cdot \mathbf{w})$ defined? Explain your answer.
5. (a) For a cube with side length equal to 1, show that only possible distances between its two vertices are 1, $\sqrt{2}$, and $\sqrt{3}$. (b) Take one vertex of a cube, say A , and connect it to two vertices B and C for which $AB = AC = \sqrt{2}$. Determine the angle $\angle BAC$.