Answer on Question #43461 – Math – Analytic Geometry

Two vector a & b are added. Prove that the magnitude of resultant vector cannot be greater than (a+b) and smaller than (a-b)

Solution

The magnitude of resultant vector is

$$|\overrightarrow{a+b}| = \sqrt{a^2 + b^2 + 2ab\cos\theta},$$

where θ is the angle between the vectors $\vec{a}$ and $\vec{b}$.

When θ is zero, then resultant vector has the maximum length, equal to $\sqrt{a^2 + b^2 + 2ab} = \sqrt{(a+b)^2} = |a+b|$.

When θ is 180 degrees, then resultant vector has the minimum length, equal to $\sqrt{a^2 + b^2 - 2ab} = \sqrt{(a-b)^2} = |a-b|$.