[10-02-19-T11]

For all vectors $\vec{u}$, $\vec{v}$:

[1] Prove that $(\vec{u} \cdot \vec{v})^2 \leq |\vec{u}|^2 \, |\vec{v}|^2$

[2] Prove that $|\vec{u} + \vec{v}|^2 \leq |\vec{u}|^2 + 2\, \vec{u} \cdot \vec{v} + |\vec{v}|^2$

[3] Use [1] and [2] to prove the triangle inequality: $|\vec{u} + \vec{v}| \leq |\vec{u}| + |\vec{v}|$