Homework #1

Problem 1:

Part a)
In the figure

$$A' = Asin\gamma \quad (1)$$

Using Pythagoras' theorem we obtain that

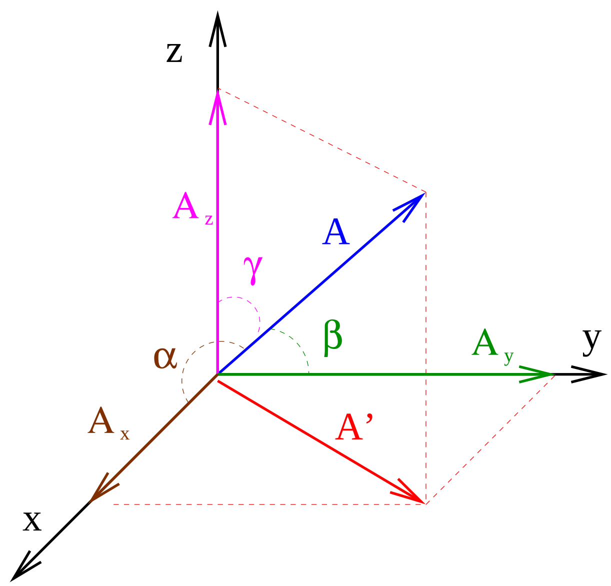
$$A' = (A_x^2 + A_y^2)^{1/2}, \quad (2)$$

and using Pythagoras again

$$A = (A'^2 + A_z^2)^{1/2}. \quad (3)$$

Plugging Eq.(2) in Eq.(3) we obtain

$$A = (A_x^2 + A_y^2 + A_z^2)^{1/2}. \quad (4)$$



Part b)
The components of A can be written in terms of the direction cosines:

$$A_x = Acos\alpha, \quad (5)$$

$$A_y = Acos\beta, \quad (6)$$

$$A_z = Acos\gamma. \quad (7)$$

Replacing (5), (6), and (7) in (4):

$$A = [A^2(cos^2\alpha + cos^2\beta + cos^2\gamma)]^{1/2}. \quad (8)$$

Then, Eq.(8) is satisfied only if

$$(cos^2\alpha + cos^2\beta + cos^2\gamma) = 1. \quad (9)$$