Solution: 21-S-2.5-MK-001

Cartesian vector: $\vec{A} = 2\hat{i} + 3\hat{j} + 4\hat{k}$

Magnitude: $A = \sqrt{2^2 + 3^2 + 4^2} = 5.385$

$\alpha = \cos^{-1}\frac{A_x}{A} = \cos^{-1}\left(\frac{2}{5.385}\right) = 68.197^\circ$

$\beta = \cos^{-1}\frac{A_y}{A} = \cos^{-1}\left(\frac{3}{5.385}\right) = 56.144^\circ$

$\gamma = \cos^{-1}\frac{A_z}{A} = \cos^{-1}\left(\frac{4}{5.385}\right) = 42.029^\circ$

$\vec{u}_A = \frac{\vec{A}}{A} = \frac{A_x}{A}\hat{i} + \frac{A_y}{A}\hat{j} + \frac{A_z}{A}\hat{k} = \frac{2}{5.385}\hat{i} + \frac{3}{5.385}\hat{j} + \frac{4}{5.385}\hat{k}$

$\vec{u}_A = 0.3714\,\hat{i} + 0.557\,\hat{j} + 0.743\,\hat{k}$

Check: $0.371^2 + 0.557^2 + 0.743^2 = 1$ ✓

$\phi = \gamma = 42.029^\circ$

$\theta = \sin^{-1}\left(\frac{A_y}{A\sin\phi}\right) = \sin^{-1}\left(\frac{3}{5.385\sin 42.029}\right) = 33.692^\circ$

FIVE STAR.