12.492

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Question:
Direction cosines of the vector $3\hat{\mathbf{i}} + -2\hat{\mathbf{j}} + 6\hat{\mathbf{k}}$ are

a) $[3/7, -2/7, 6/7]$
b) $[-3/7, 2/7, -6/7]$
c) $[-7/3, 7/2, -7/6]$
d) $[7/3, -7/2, 7/6]$

Solution:
let

$$\mathbf{r} = \begin{pmatrix} 3 \\ -2 \\ 6 \end{pmatrix} \tag{1}$$

$$\|\mathbf{r}\| = \sqrt{9 + 4 + 36} \tag{2}$$

$$\implies \|\mathbf{r}\| = 7 \tag{3}$$

The unit vector in the direction of $\mathbf{r}$ is

$$\frac{\mathbf{r}}{\|\mathbf{r}\|} = \frac{1}{7}\begin{pmatrix} 3 \\ -2 \\ 6 \end{pmatrix} = \begin{pmatrix} \frac{3}{7} \\ \frac{-2}{7} \\ \frac{6}{7} \end{pmatrix} \tag{4}$$

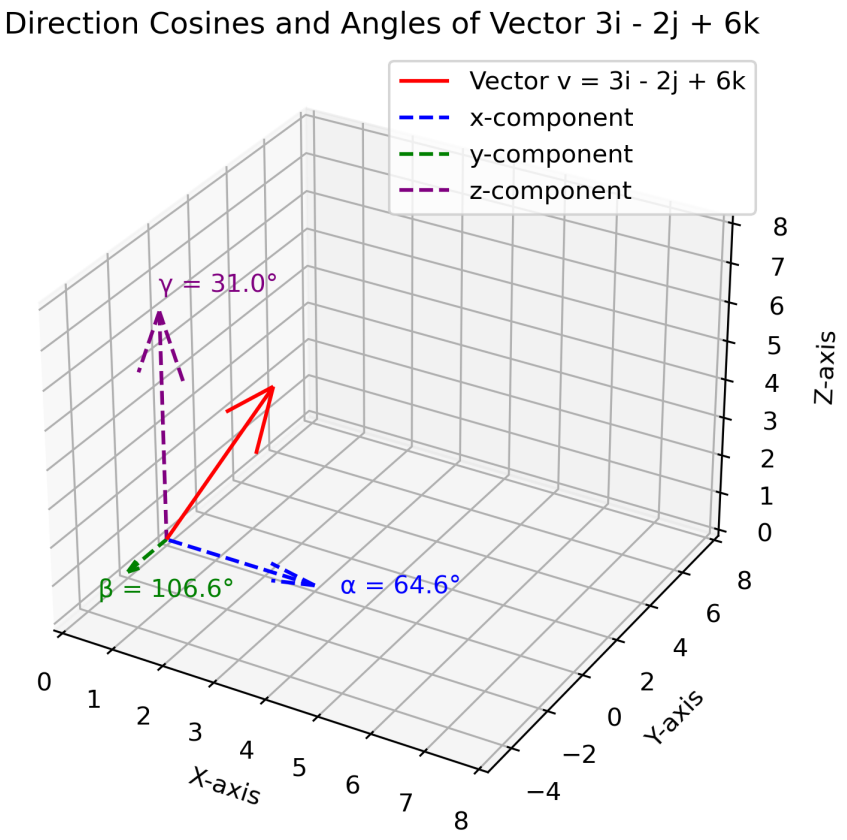

Fig. 4