VECTOR ASSIGNMENT

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1 PROBLEM 1

1. Find a vector in the direction of the vector $\begin{pmatrix} 5 \\ -1 \\ 2 \end{pmatrix}$ which has magnitude 8 units.

SOLUTION:

Let the required vector be $c\begin{pmatrix} 5 \\ -1 \\ 2 \end{pmatrix}$, where $c \in \mathbb{R}$.

Since this vector has magnitude 8,

$$\left\| c\begin{pmatrix} 5 \\ -1 \\ 2 \end{pmatrix} \right\| = c\sqrt{5^2 + (-1)^2 + 2^2} = 8 \tag{1.0.1}$$

$$\implies c = \frac{8}{\sqrt{30}} = \frac{4\sqrt{30}}{15} \tag{1.0.2}$$

$$Thus,\ the\ required\ vector = \frac{4\sqrt{30}}{15}\begin{pmatrix} 5 \\ -1 \\ 2 \end{pmatrix} = \begin{pmatrix} 7.30296743 \\ -1.46059349 \\ 2.92118697 \end{pmatrix} \tag{1.0.3}$$