Quiz 1  Calculus 3  9/9/2005

Each problem is worth 5 points. Clear and complete justification is required for full credit.

Use the vectors \( \vec{u} = 3\hat{i} + 2\hat{j} - \hat{k} \) and \( \vec{v} = -2\hat{i} + \hat{j} + 2\hat{k} \) for the following problems:

1. Find \( \|\vec{u}\| \).

\[
\|\vec{u}\| = \sqrt{a^2 + b^2 + c^2}
\]

\[
\|\vec{u}\| = \sqrt{3^2 + 2^2 + (-1)^2}
\]

\[
\|\vec{u}\| = \sqrt{9 + 4 + 1}
\]

\[
\|\vec{u}\| = \sqrt{14}
\]

2. Find a unit vector in the direction of \( \vec{v} \).

\[
\text{unit vector} = \frac{\vec{v}}{\|\vec{v}\|}
\]

\[
\|\vec{v}\| = \sqrt{4 + 1 + 4}
\]

\[
= \sqrt{9}
\]

\[
= 3
\]

\[
\frac{-2\hat{i} + \hat{j} + 2\hat{k}}{3}
\]

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Excellent

The unit vector is \( \frac{-2}{3} \hat{i} + \frac{1}{3} \hat{j} + \frac{2}{3} \hat{k} \).