

SOLUTIONS

QUIZ 002

GIVEN: TWO VECTORS $U=3i-2j+6k$ AND $V=4i+12j-3k$.

- A) DETERMINE THE MAGNITUDES OF U AND V .
 B) DETERMINE THE MAGNITUDE OF THE VECTOR $3U+2V$.
 C) DETERMINE THE UNIT VECTOR IN THE DIRECTION OF $3U+2V$.

REQUIRED:

$$|U| = ? \quad |V| = ? \quad |3U+2V| = ?$$

$$\hat{e}_{3U+2V} = ?$$

SOLUTION:

$$|U| = \sqrt{3^2 + 2^2 + 6^2} = 7$$

$$|V| = \sqrt{\text{SUM OF SQUARES}} = 13$$

$$3U = 9\hat{i} - 6\hat{j} + 18\hat{k}$$

$$2V = 8\hat{i} + 24\hat{j} - 6\hat{k}$$

$$3U+2V = 17\hat{i} + 18\hat{j} + 12\hat{k}$$

$$|3U+2V| = \sqrt{17^2 + 18^2 + 12^2} = \sqrt{757} \approx 27.5$$

$$\hat{e} = \frac{17}{\sqrt{757}} \hat{i} + \frac{18}{\sqrt{757}} \hat{j} + \frac{12}{\sqrt{757}} \hat{k} = \frac{3\vec{U} + 2\vec{V}}{|3U+2V|}$$

$$= 0.618\hat{i} + 0.654\hat{j} + 0.436\hat{k}$$

$$\text{CHECK } \sqrt{(0.618)^2 + (0.654)^2 + (0.436)^2} = 1 \quad \checkmark$$

$$|U| = 7 \quad |V| = 13$$

$$|3U+2V| = \sqrt{757}$$

$$\hat{e}_{3U+2V} = \{0.62\hat{i} + 0.65\hat{j} + 0.44\hat{k}\}$$