Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 3, September 2, 2020

Express $\vec{v} = 2\vec{i} + 3\vec{j}$ as the sum of a vector parallel to $\vec{b} = 3\vec{i} + 4\vec{j}$ and a vector orthogonal to $\vec{b}$. Check your answer. Make sure it is correct.

We calculate

$$\text{proj}_{\vec{b}}\,\vec{v} = \frac{\vec{b}\cdot\vec{v}}{\vec{b}\cdot\vec{b}}\vec{b} = \frac{18}{25}(3\vec{i} + 4\vec{j})$$

$$\vec{v} - \text{proj}_{\vec{b}}\,\vec{v} = (2\vec{i} + 3\vec{j}) - \frac{18}{25}(3\vec{i} + 4\vec{j}) = \frac{1}{25}(-4\vec{i} + 3\vec{j}).$$

We see that $\frac{18}{25}(3\vec{i} + 4\vec{j})$ is parallel to $\vec{b}$;
$\frac{1}{25}(-4\vec{i} + 3\vec{j})$ is orthogonal to $\vec{b}$; and
$\frac{18}{25}(3\vec{i} + 4\vec{j}) + \frac{1}{25}(-4\vec{i} + 3\vec{j}) = \vec{v}$

Check: All three assertions are true and obvious.