Math 251, section 01

Quiz 1   August 31, 2016
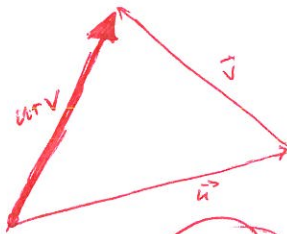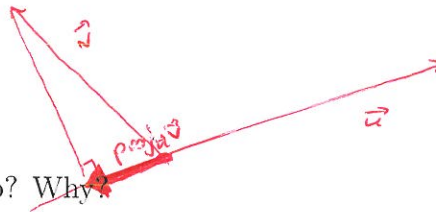
Name:

Here are two vectors: $\mathbf{u}$ $\mathbf{v}$
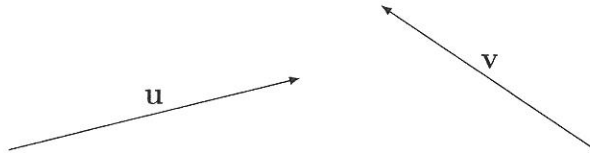
(1) Draw $\mathbf{u} + \mathbf{v}$.   ②

(2) Draw $\mathrm{proj}_{\mathbf{u}}\,\mathbf{v}$.   ③

(3) Is $\mathbf{u} \cdot \mathbf{v}$ positive, negative, or zero? Why?   ③

angle between $\vec{u}$ & $\vec{v}$ is obtuse

(4) Is $\mathbf{u} \times \mathbf{v}$ zero, parallel to the page, **out of the page toward you**, or out of the page away from you? Why?   ③

right hand rule

Let $\mathbf{a} = \langle 2, -4, 1 \rangle$ and $\mathbf{b} = \langle 5, 2, 5 \rangle$.

(5) Compute $\mathbf{a} + 2\mathbf{b}$.   ③

$$= \langle 2 + 2\cdot 5, \ -4 + 2\cdot 2, \ 1 + 2\cdot 5 \rangle = \langle 12, 0, 11 \rangle$$

(6) Compute $\mathrm{proj}_{\mathbf{a}}\,\mathbf{b}$.   ③

$$= \frac{a \cdot b}{a \cdot a}\,\vec{a} = \frac{2\cdot 5 - 4\cdot 2 + 1\cdot 5}{2^2 + (-4)^2 + 1^2}\langle 2, -4, 1\rangle = \frac{7}{21}\langle 2, -4, 1\rangle$$

$$\left(= \tfrac{1}{3}\langle 2, -4, 1\rangle\right)$$

(7) Compute $\mathbf{a} \times \mathbf{b}$.   ③

$$= \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2 & -4 & 1 \\ 5 & 2 & 5 \end{vmatrix} = \left\langle \begin{vmatrix} -4 & 1 \\ 2 & 5 \end{vmatrix}, \ -\begin{vmatrix} 2 & 1 \\ 5 & 5 \end{vmatrix}, \ \begin{vmatrix} 2 & -4 \\ 5 & 2 \end{vmatrix} \right\rangle$$

$$= \langle -4\cdot 5 - 2\cdot 1, \ -2\cdot 5 + 5\cdot 1, \ 2\cdot 2 - 5(-4) \rangle$$

$$= \langle -22, \ -5, \ 24 \rangle$$