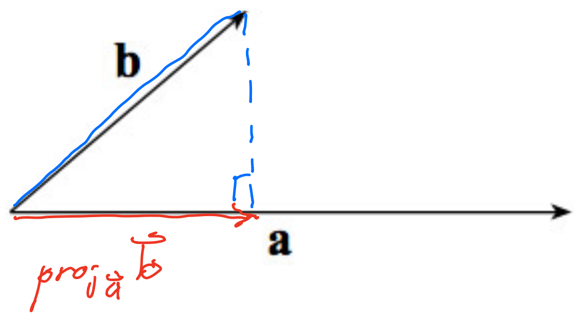
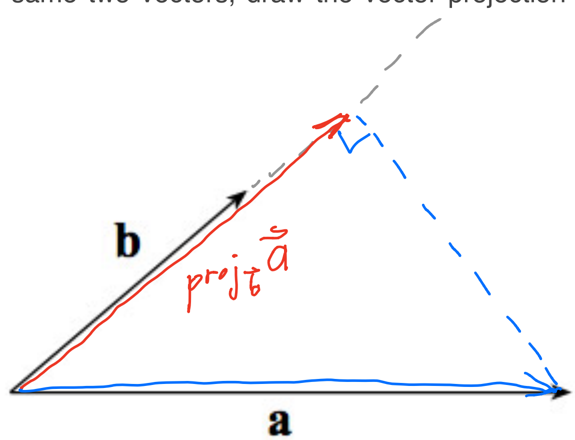
[9.3] - Reading Assignment

Read section 9.3 in the textbook and answer these questions.

1. For the two vectors shown, draw the vector projection of $\vec{\mathbf{b}}$ onto $\vec{\mathbf{a}}$.



2. For the same two vectors, draw the vector projection of $\vec{\mathbf{a}}$ onto $\vec{\mathbf{b}}$.



3. What is the angle between the vectors $\overset{\vec a}{\langle 1, 0, -1\rangle}$ and $\overset{\vec b}{\langle 1, 1, 0\rangle}$?

$\vec a \cdot \vec b = \langle 1,0,-1\rangle \cdot \langle 1,1,0\rangle = 1^2 + 0\cdot 1 + -1\cdot 0 = 1$ $\quad a = |\vec a| = \sqrt{2}$ $\quad b = |\vec b| =$

also $\vec a \cdot \vec b = ab\cos\theta \Rightarrow \cos\theta = \frac{\vec a\cdot\vec b}{ab} = \frac{1}{\sqrt2\sqrt2} = \frac{1}{2}$ so $\theta = \arccos\frac{1}{2} = 60°$ or $\pi/3$ Radians = 1.06 Radians

4. Suppose that $\vec{\mathbf{a}} \neq 0$ and $\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} = \vec{\mathbf{a}} \cdot \vec{\mathbf{c}}$. This means that $\vec{\mathbf{b}}$ and $\vec{\mathbf{c}}$ have the same projection onto $\vec{\mathbf{a}}$. Does this automatically mean that $\vec{\mathbf{b}} = \vec{\mathbf{c}}$?

   Consider $\vec{\mathbf{a}} = \langle 1, 2\rangle$ and $\vec{\mathbf{b}} = \langle 2, 1\rangle$. Show that the answer to the question above is "no", by finding a vector $\vec{\mathbf{c}}$ which is not equal to $\vec{\mathbf{b}}$, but never the less satisfies $\vec{\mathbf{a}} \cdot \vec{\mathbf{b}} = \vec{\mathbf{a}} \cdot \vec{\mathbf{c}}$.

5. Write up a sentence or 2 about at least one "muddy point" in the reading that you'd like to clear up. Be as specific as possible. Or (if nothing seemed muddy) one thing that you *wonder* about.

4) $\vec a \cdot \vec b = \langle 1,2\rangle \cdot \langle 2,1\rangle = 2+2 = 4$

so we need a $\vec c$ such that

$4 = \vec a \cdot \vec c = \langle 1,2\rangle \cdot \langle x,y\rangle = x + 2y = 4$

So, one choice is $\vec c = \langle x,y\rangle = \langle 4,0\rangle$

another choice is $\vec{c} = \langle 8, -4 \rangle$

another choice is $\vec{c} = \langle \frac{1}{2}, \frac{3}{2} \rangle$

many others are possible!