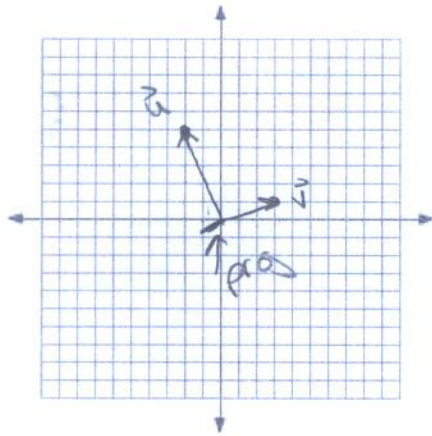


9. Find the length of the projection of $\mathbf{u} = \langle -2, 5 \rangle$ onto $\mathbf{v} = \langle 3, 1 \rangle$. Sketch \mathbf{u} , \mathbf{v} and the projection.



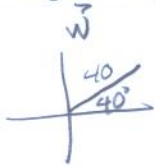
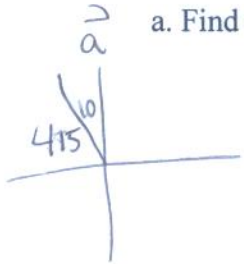
$$\vec{n}_v = \left\langle \frac{3}{\sqrt{10}}, \frac{1}{\sqrt{10}} \right\rangle$$

$$\vec{u} \cdot \vec{n}_v = \frac{-6}{\sqrt{10}} + \frac{5}{\sqrt{10}} = \frac{-1}{\sqrt{10}}$$

9. $\frac{-1}{\sqrt{10}}$

10. An airplane is flying at a bearing of 350° and 415mph and the wind is blowing with a bearing of 50° at 40mph.

a. Find the actual ground speed of the plane.



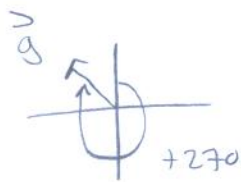
$$\vec{a} = \langle -411.422, 434.407 \rangle$$

$$\vec{a} = 415 \langle \cos 100^\circ, \sin 100^\circ \rangle \quad \vec{w} = \langle 40 \cos 40^\circ, 40 \sin 40^\circ \rangle$$

a. $\sqrt{A^2 + B^2} = 436.377 \text{ mph}$

b. Find the direction of the plane relative to the ground.

$$\tan^{-1} \frac{B}{A} = -84.553$$



bearing

b. 354.553°