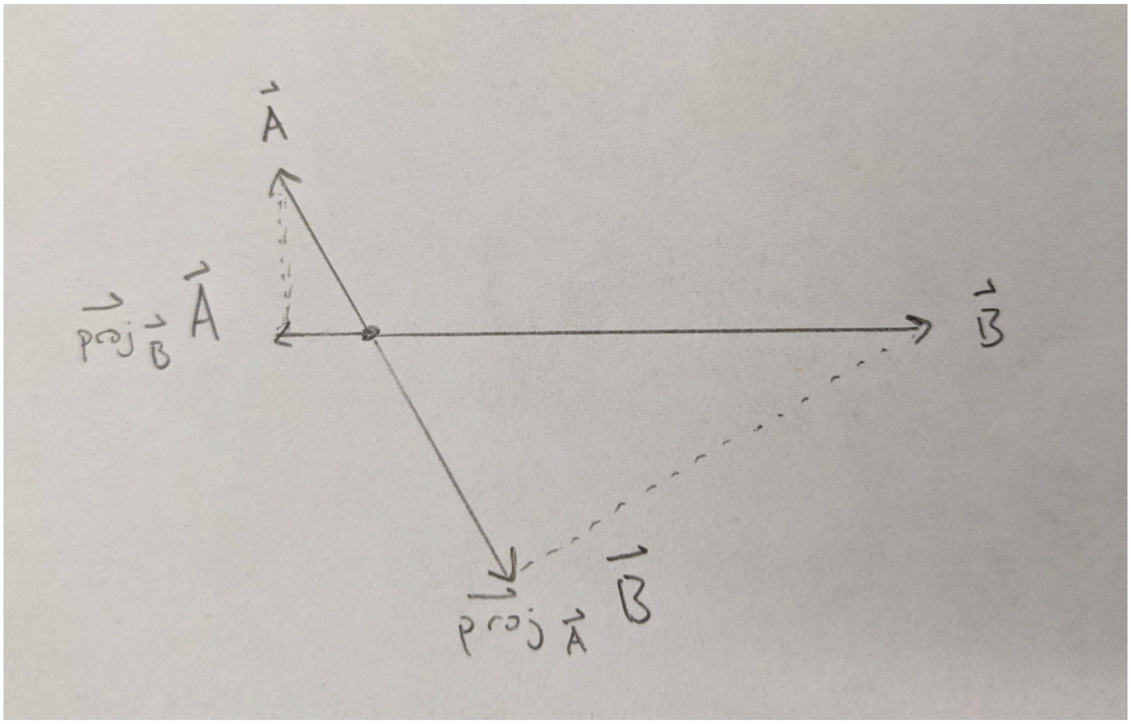
1 | Problem 1:

1.1 | 1.1)



1.2 | 1.2)

$comp_{\vec{A}}\vec{B} = |\vec{B}|\cos(\theta) = 6\cos(\frac{2\pi}{3}) = -3$ $comp_{\vec{B}}\vec{A} = |\vec{A}|\cos(\theta) = 2\cos(\frac{2\pi}{3}) = -1$

1.3 | 1.3)

$\vec{A}\cdot\vec{B}$
$= |\vec{A}||\vec{B}|\cos(\theta) = 6\cdot 2\cdot(-0.5)$
$= -6$

2 | Problem 2:

$comp_{\vec{A}}\vec{B} = |\vec{B}|\cos(\theta)$
$= |\vec{B}|\cos(\theta)\times\frac{|\vec{A}|}{|\vec{A}|}$
$= \frac{|\vec{A}||\vec{B}|\cos(\theta)}{|\vec{A}|}$
$= \frac{\vec{A}\cdot\vec{B}}{|\vec{A}|}$

3 | Problem 3:

The projection of $\vec{B}$ onto $\vec{A}$ would be the $\vec{A}$ component of $\vec{B}$ times the unit vector of $\vec{A}$ to give the component a direction and make it a vector: $\vec{proj}_{\vec{A}}\vec{B} = comp_{\vec{A}}\vec{B} \cdot \hat{A}$
$= |\vec{B}|\cos(\theta) \cdot \frac{\vec{A}}{|\vec{A}|}$
$= \frac{|\vec{B}|\cos(\theta)}{|\vec{A}|}\vec{A}$

4 | Problem 4:

The vector component of $\tilde{A}$ onto the vector perpendicular to $\tilde{B}$ is the $\vec{proj}_{\perp\tilde{B}}\tilde{A}$, where $\perp\ \tilde{B}$ is a vector perpendicular to $\tilde{B}$. If we set $\tilde{B}$ as the x axis, then the y axis would be $\perp\ \tilde{B}$ and the "y component of A" would be $\vec{proj}_{\perp\tilde{B}}\tilde{A}$. Thus:

$\tilde{A}_{\perp\tilde{B}} = \vec{proj}_{\perp\tilde{B}}\tilde{A} = \tilde{A}\sin(\theta)$ where θ is the angle between $\tilde{A}$ and $\tilde{B}$.

To prove that this is perpendicular we can take the dot product of $\tilde{A}_{\perp\tilde{B}}$ and $\tilde{B}$:

$|\tilde{A}_{\perp\tilde{B}}||\tilde{B}|\cos(\theta_1) = |\tilde{A}_{\perp\tilde{B}}||\tilde{B}|\cos(\frac{\pi}{2}) = |\tilde{A}_{\perp\tilde{B}}||\tilde{B}| \cdot 0 = 0$

5 | Problem 5: