Last Name: _____

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Quiz 7 (B)

Question 1. *(3 marks)* Given the point $Q(2,-2,5)$ find an initial point P so that the vector $\vec{PQ}$ is in the opposite direction as $\vec{v} = (3,-4,-1)$.

LET P BE THE POINT $P(x,y,z)$

THEN $\vec{PQ} = (2-x, -2-y, 5-z) = -\vec{v} = (-3,4,1)$

$\Rightarrow \quad x = 5, \quad y = -6, \quad z = 4$

THE THE INITAL POINT IS $P(5,-6,4)$

Question 2. *(3 marks)* Given $\vec{u} = (2,1,-3)$, $\vec{v} = (0,1,3)$, and $\vec{w} = (-2,2,-1)$ evaluate $\|3\vec{u} - 2\vec{v} + \vec{w}\|$. $3\vec{u} - 2\vec{v} + \vec{w} = 3(2,1,-3) - 2(0,1,3) + (-2,2,-1)$

$= (6,3,-9) - (0,2,6) + (-2,2,-1) = (4,3,-16)$

$\therefore \|3\vec{u} - 2\vec{v} + \vec{w}\| = \sqrt{4^2 + 3^2 + (16)^2} = \sqrt{281}$

Question 3. *(4 marks)* Find the angle between the vectors $\vec{u} = (1,-1,-2)$, and $\vec{v} = (4,2,-2)$.

$\vec{u} \cdot \vec{v} = \|\vec{u}\| \, \|\vec{v}\| \cos\theta \quad \Rightarrow \quad \cos\theta = \dfrac{\vec{u} \cdot \vec{v}}{\|\vec{u}\| \, \|\vec{v}\|}$

$\vec{u} \cdot \vec{v} = (1,-1,-2) \cdot (4,2,-2) = 4 - 2 + 4 = 6$

$\|\vec{u}\| = \sqrt{1^2 + (-1)^2 + (-2)^2} = \sqrt{6}$

$\|\vec{v}\| = \sqrt{4^2 + 2^2 + (-2)^2} = \sqrt{24}$

$\therefore \cos\theta = \dfrac{6}{\sqrt{6}\sqrt{24}} = \dfrac{6}{\sqrt{144}} = \dfrac{6}{12} = \dfrac{1}{2}$

$\therefore \theta = \dfrac{\pi}{3}$