Last Name: SOLUTIONS

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Quiz 7 (A)

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

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

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

$\Rightarrow \quad x=4, \; y=-2, \; z=3$

SO WE HAVE INITAL POINT $P(4,-2,3)$

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

$3\vec{u}-2\vec{v}+\vec{w} = 3(1,3,-1) - 2(0,2,2) + (-3,1,2)$

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

$= (0,6,-5)$

$\therefore \|3\vec{u}-2\vec{v}+\vec{w}\| = \sqrt{0^2+6^2+(-5)^2} = \sqrt{36+25} = \sqrt{61}$

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

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

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

$\|\vec{u}\| = \sqrt{2^2+(-2)^2+(-4)^2} = \sqrt{4+4+16} = \sqrt{24}$

$\|\vec{v}\| = \sqrt{2^2+1^2+(-1)^2} = \sqrt{4+1+1} = \sqrt{6}$

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

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