HW Set-1

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Q3

1.a) $|\vec{u} \times \vec{v}| = |\vec{u}||\vec{v}| \sin\theta$
$= 3 \times 5 \times \sin 90 = 15$ ($\vec{u} = [x, y, 0], \vec{v} = [0, 0, z]$)

b) $\vec{u} \times \vec{v}_1 > 0$

c) $\vec{u} \times \vec{v}_1 < 0$ (Right hand rule says $\vec{u} \times \vec{v}$ will be in 4th quad of my plane)

d) $\vec{u} \times \vec{v}_2 = 0$

2. Because $|\vec{u}| = |\vec{v}| = |\vec{u} - \vec{v}| = 2\sqrt{2}$ the 3 form an eq. triangle $\therefore \theta = \pi/3$

a) $|\vec{u} + \vec{v}| = (|\vec{u}|^2 + |\vec{v}|^2 + 2|\vec{u}||\vec{v}| \cos\pi/3)^{1/2}$
$= \sqrt{8+8+8} = 2\sqrt{6}$

b) $\theta = \pi/3$

Q3 a) If $a = 2$, $A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 6 & 2 \\ 0 & 2 & 5 \end{bmatrix} \to \begin{bmatrix} 1 & 3 & 2 \\ 0 & 0 & 5 \\ 2 & 6 & 2 \end{bmatrix} \to \begin{bmatrix} 1 & 3 & \frac{2}{5} \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

$\therefore$ with $a = 2$ satisfies the given cond^n

b) $\det \begin{vmatrix} 1 & 3 & 2 \\ a & 6 & 2 \\ 0 & a & 5 \end{vmatrix} = 0$

$1(30 - 18) - 3(5a) + 18a = 0$

$a = -4$