Ass. 3

TOTAL = 19

(1) For this $\vec{a} = \begin{bmatrix} 3 \\ 0 \\ 2 \end{bmatrix}$, $\vec{b} = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$

(a) $\vec{c} = 2\vec{a} - 3\vec{b} = \begin{bmatrix} 0 \\ 3 \\ 1 \end{bmatrix}$

(b) $\|\vec{c}\| = \sqrt{10} \simeq 3.16$

(c) $2\|\vec{c}\| - 3\|\vec{b}\| = 2\sqrt{13} - 3\sqrt{6} \simeq -0.14$

Ans: NO

(d) $\theta = \angle(\vec{a}, \vec{b})$ satisfies

$$\cos\theta = \frac{\vec{a}\cdot\vec{b}}{\|\vec{a}\|\|\vec{b}\|} = \frac{8}{\sqrt{13}\sqrt{6}} \simeq 0.9058$$

$\theta \simeq 25.1°$

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(2) $\sqrt{(1-2)^2 + (1-0)^2 + (1-(-1))^2 + (1-3)^2}$

$= \sqrt{10}$

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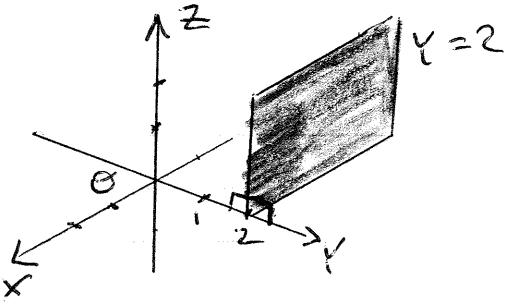
(3) $\cos\alpha = \frac{\vec{v}\cdot\vec{z}}{\|\vec{v}\|\|\vec{z}\|} = \frac{-1}{\sqrt{2}}$

$\begin{cases} \alpha = 135° \text{ (or } 3\pi/4 \text{ rad)} \\ \beta = 90° \text{ (} \pi/2 \text{ "} \\ \gamma = 45° \text{ (} \pi/4 \text{ "} \end{cases}$

(4) We are in $\mathbb{R}^3$

(5) For this

(a)



(1)

unit normal $\pm \langle 0, 1, 0 \rangle$ (1)
or $\pm \vec{j}$

Plane is parallel to x, z axes (1)

(b) $-x + 1y + 0z = 3$ (1)

$\vec{n} = \langle -1, 1, 0 \rangle$ (or any non-zero multiple)

(c) $\vec{n} = [n_1, n_2, n_3]$ (1)

Plane is parallel to each axis for which corresponding entry in $\vec{n}$ is 0.

-OVER-

(4) 5 (a) $\vec{j} \times \vec{k} = \vec{i}$ (or $= \langle 1,0,0 \rangle$)

$\langle 0,1,0 \rangle$
$\langle 0,0,1 \rangle$
$\langle 1,0,0 \rangle$

(b) $\vec{k} \times \vec{j} = -\vec{i}$ (or $\langle -1,0,0 \rangle$)

(c) $\vec{j} \times 3\vec{k} = 3\vec{i} = \langle 3,0,0 \rangle$

(d) $\langle 3,-1,2 \rangle \times \langle 1,1,-1 \rangle = \langle -1,5,4 \rangle$

$\langle 3,-1,2 \rangle$
$\langle 1,1,-1 \rangle$
$\langle -1,5,4 \rangle$