24/11

No.

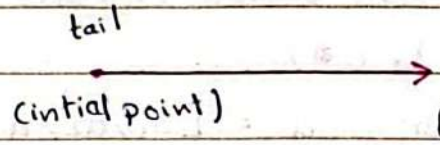
New chapter:

9.1) vector in 2-space & 3-space

① Scalar: quantity that is determined by it's magnitude like [time, length]

② vector: quantity that is determined by magnitude & direction like [force]

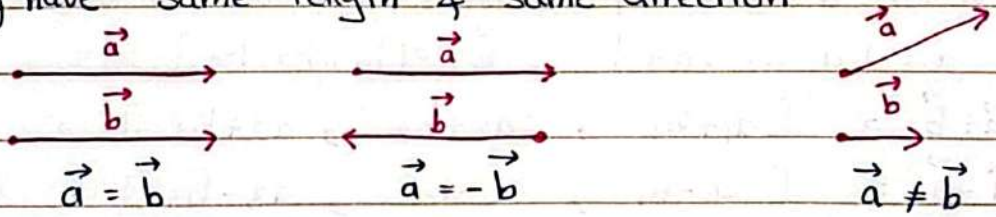
for vector $a \equiv \vec{a}$



($|\vec{a}|$ = length = norm = Magnitude)

if $|\vec{a}| = 1$ $\vec{a}$ is unit vector

Def: Two vectors $\vec{a}$ & $\vec{b}$ are equal so $\vec{a} = \vec{b}$ iff they have same length & same direction



Component of vectors:

for vector $\vec{a}$ has initial point $p: (x_1, y_1, z_1)$ & terminal point $Q: (x_2, y_2, z_2)$

$a_1 = x_2 - x_1$, $a_2 = y_2 - y_1$, $a_3 = z_2 - z_1$

$\vec{a} = [a_1, a_2, a_3]$, $|\vec{a}| = \sqrt{a_1^2 + a_2^2 + a_3^2}$

Ex: for vector $\vec{a}$ with intial point $p: (4,0,2)$ & terminal point $Q: (6,-1,2)$ find vector component + $|\vec{a}|$?

$a_1 = 6 - 4 = 2$

$a_2 = -1 - 0 = -1$

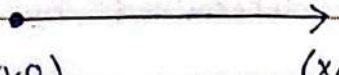
$a_3 = 2 - 2 = 0$

$\vec{a} = (2,-1,0)$

$|\vec{a}| = \sqrt{4+1+0} = \sqrt{5}$

No.

* position vector ($\vec{r}$) at point $A:(x,y,z)$ is a vector with origin $(0,0,0)$ as initial point & A as terminal point.



* zero vector :- has length zero & no-direction
↳ (•)

For $\vec{a} = [a_1, a_2, a_3]$ & $\vec{b} = [b_1, b_2, b_3]$ if $\vec{a} = \vec{b}$

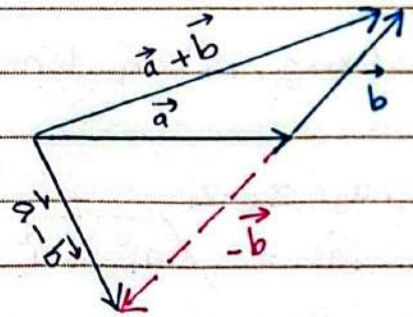
then ① $a_1 = b_1$
② $a_2 = b_2$
③ $a_3 = b_3$

* vector addition & scalar multiplication for

$\vec{a} = [a_1, a_2, a_3]$, $\vec{b} = [b_1, b_2, b_3]$

$\vec{a}+\vec{b} = [a_1+b_1 \ , \ a_2+b_2 \ , \ a_3+b_3]$

$\vec{a}-\vec{b} = [a_1-b_1 \ , \ a_2-b_2 \ , \ a_3-b_3]$



* Rules :

① $\vec{a}+\vec{b} = \vec{b}+\vec{a}$

② $[\vec{u}+\vec{v}]+\vec{w} = \vec{u}+[\vec{v}+\vec{w}]$

③ $\vec{a}+0 = \vec{a}$

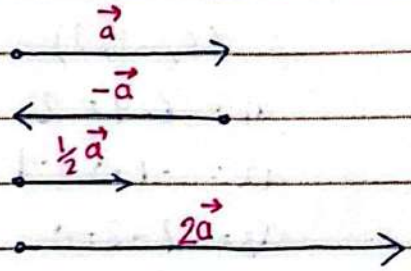
④ $\vec{a}+(-\vec{a}) =$ zero

* Scalar multiplication:

$\vec{a} = [a_1, a_2, a_3]$

$C\vec{a} = [Ca_1, Ca_2, Ca_3]$

C: Scalar



smile for life

No.

Rules:

① $c[\vec{a}+\vec{b}] = c\vec{a} + c\vec{b}$

② $(c+k)\vec{a} = c\vec{a} + k\vec{a}$

③ $c[k\vec{a}] = (ck)\vec{a}$

④ $1\vec{a} = \vec{a}$

⑤ $0\vec{a} = 0$

⑥ $-1\vec{a} = -\vec{a}$

Ex: let $\vec{a} = [4, 0, 1]$ & $\vec{b} = [2, -5, \frac{1}{3}]$

① $-\vec{a} = [-4, 0, -1]$

② $7\vec{a} = [28, 0, 7]$

③ $\vec{a} + \vec{b} = [6, -5, \frac{4}{3}]$

④ $2[\vec{a} - \vec{b}] = [4, 10, \frac{4}{3}]$

Unit vector: $\hat{i}, \hat{j}, \hat{k}$

for any vector $\vec{a} = [a_1, a_2, a_3]$ we can write it as

$\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$

$\hat{i} = [1, 0, 0]$, $\hat{j} = [0, 1, 0]$, $\hat{k} = [0, 0, 1]$

Ex:

$\vec{a} = [0, 0, -3] \Rightarrow \vec{a} = -3\hat{k}$