

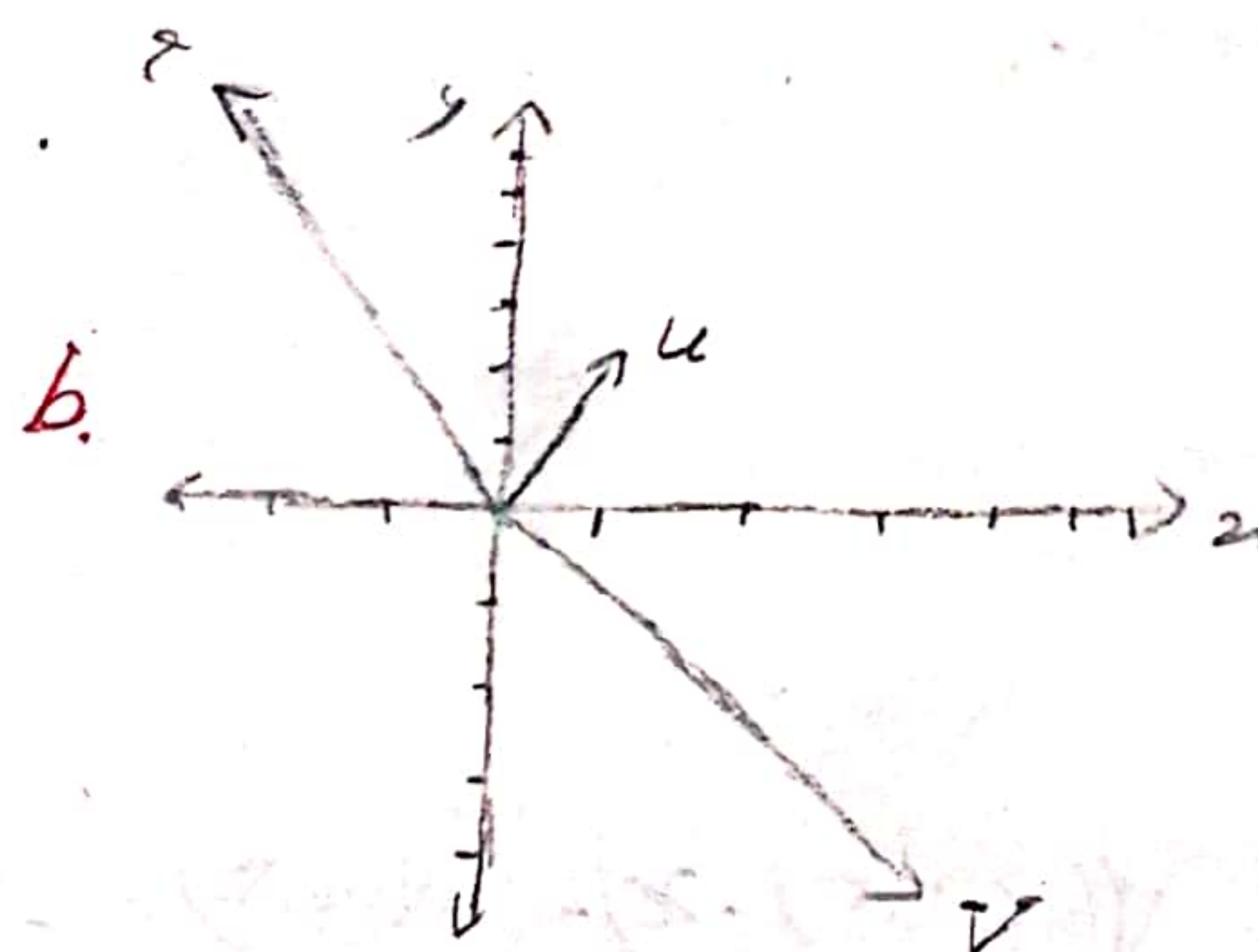
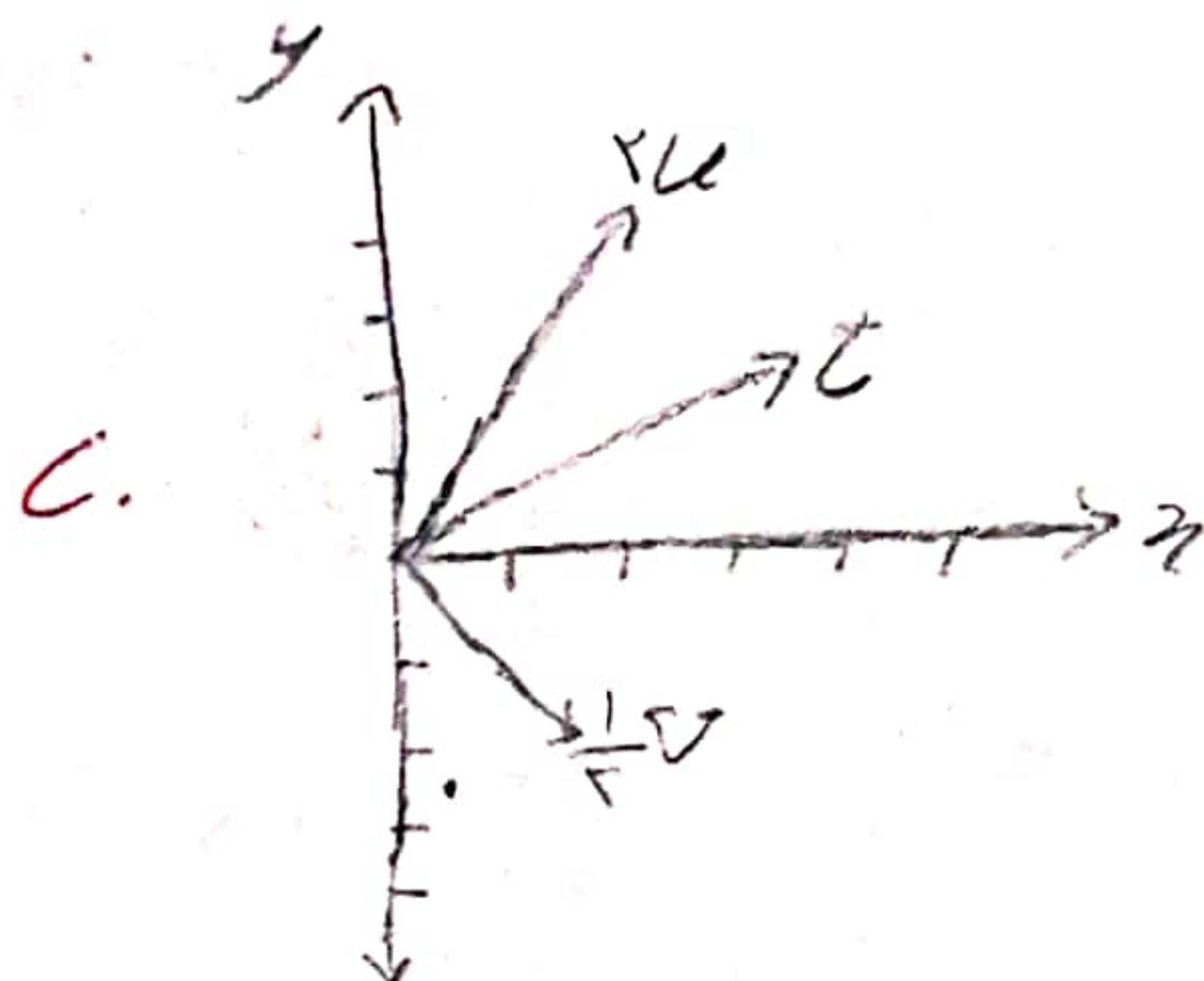
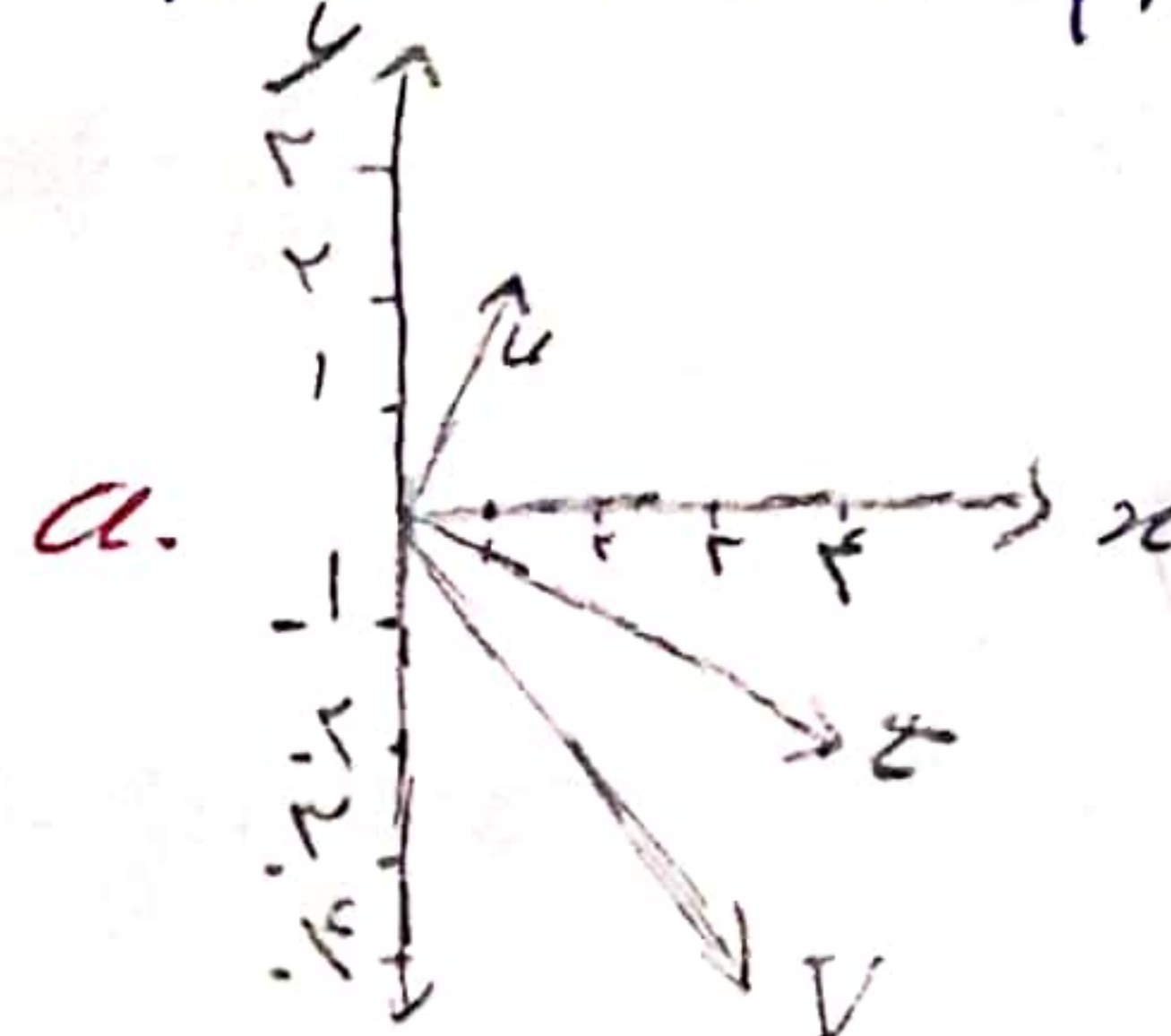
a.  $u + v = (1, 2) + (3, -4) = (4, -2) \quad \checkmark$

b.  $u - v = (1, 2) - (3, -4) = (-2, 6) \quad \checkmark$

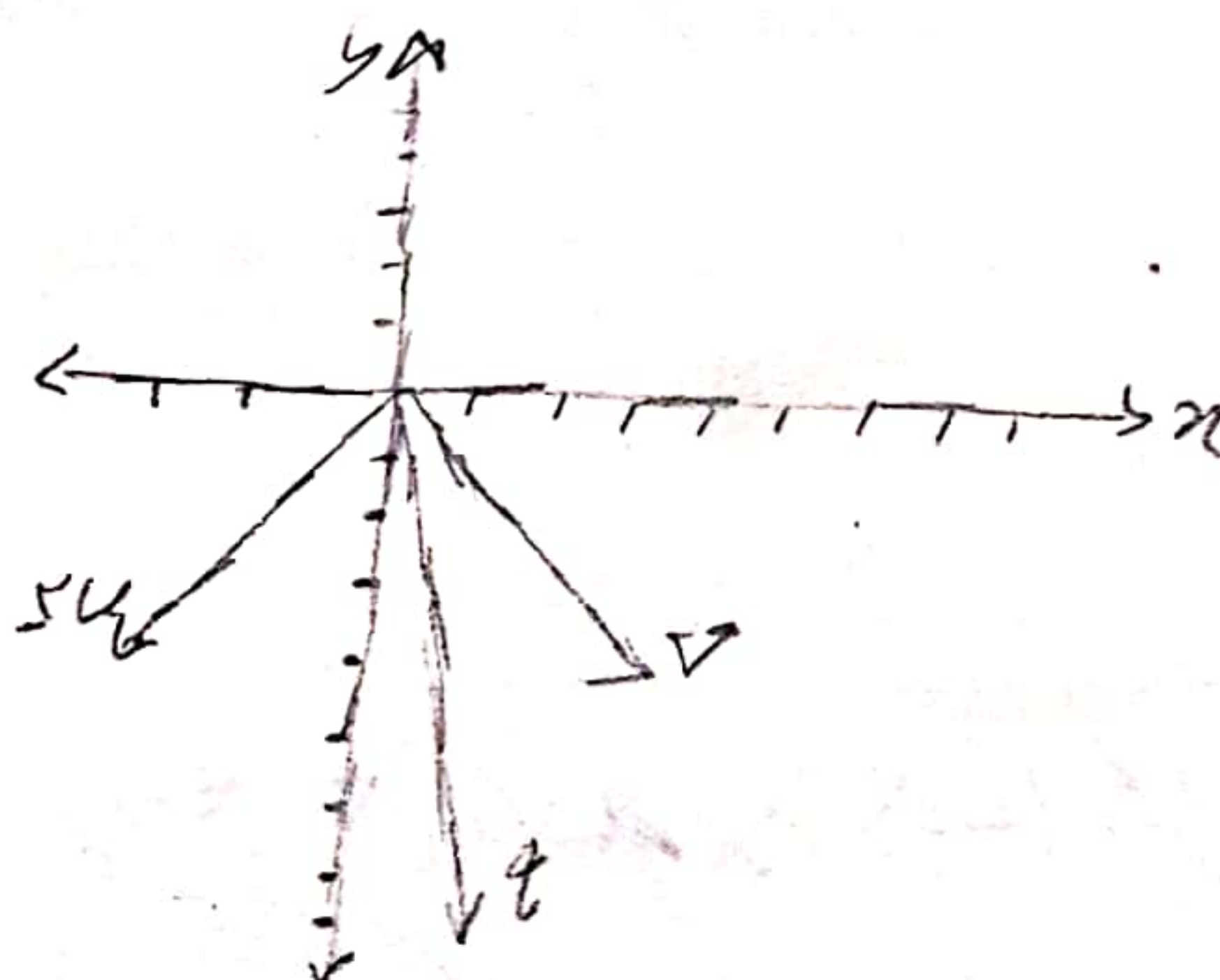
c.  $2u + \frac{1}{2}v = (2, 4) + (\frac{3}{2}, -2) = (\frac{7}{2}, 2) \quad \checkmark$

$v = (3, -4), u = (1, 2)$

جواب 1



d.  $-2u + v = (-2, -4) + (3, -4) = (1, -8) \quad \checkmark$



a.  $u + v = v + u \Rightarrow (u_x, u_y) + (v_x, v_y) = (v_x, v_y) + (u_x, u_y) \Rightarrow (u_x + v_x, u_y + v_y) = (v_x + u_x, v_y + u_y)$

جواب 2

b.  $u + (v + w) = (u + v) + w \Rightarrow (u_x, u_y) + (v_x + w_x, v_y + w_y) = (u_x + v_x + w_x, u_y + v_y + w_y)$

$\Rightarrow (u_x + u_y) + (v_x + w_x, v_y + w_y) = (u_x + v_x + w_x, u_y + v_y + w_y)$

$(u_x + v_x + w_x, u_y + v_y + w_y) = (u_x + v_x + w_x, u_y + v_y + w_y)$

$\Rightarrow h = t \quad \&\& \quad x = z \quad \checkmark$

$(u + (v + w)) = ((u + v) + w)$



$$\begin{aligned}
 c. (CK)u &= C(Ku) \Rightarrow (CK)(u_x, u_y) = C(K(u_x, u_y)) \\
 &\Rightarrow ((CK)u_x, (CK)u_y) = C(Ku_x, Ku_y) \\
 &\underbrace{((CK)u_x, (CK)u_y)}_h = \underbrace{C(Ku_x, Ku_y)}_h \Rightarrow z=h \checkmark \\
 &\Rightarrow (CK)u = C(Ku)
 \end{aligned}$$

$$\begin{aligned}
 d. K(u+v) &= Ku + Kv \Rightarrow K((u_x, u_y) + (v_x, v_y)) = (Ku_x, Ku_y) + (Kv_x, Kv_y) \\
 &\Rightarrow K(u_x + v_x, u_y + v_y) = (K(u_x + v_x), K(u_y + v_y)) \\
 &\xrightarrow[u_y + v_y = h]{u_x + v_x = z} (Kz, Kh) = (Kz, Kh) \checkmark \Rightarrow K(u+v) = Ku + Kv
 \end{aligned}$$

$$\begin{aligned}
 e. u(K+C) &= Ku + Cu \Rightarrow (u_x, u_y)(K+C) = (Ku_x, Ku_y) + (Cu_x, Cu_y) \\
 &Ku_x + Cu_x + Ku_y + Cu_y = (Ku_x + Cu_x, Ku_y + Cu_y) \\
 &(Ku_x + Cu_x, Ku_y + Cu_y) = (Ku_x + Cu_x, Ku_y + Cu_y) \checkmark
 \end{aligned}$$

سوال ترجمه شده یک یارنتر کم داشت (۴-)

$$\begin{aligned}
 x=? \quad & \begin{cases} \sqrt{(1, 2, 3) \cdot x} - (-2, 0, 4) = -2(1, 2, 3) \\ (2, 4, 6) \cdot 2x + (2, 0, -4) = (-2, -4, -6) \\ -2x(2, 4, 6) = (-4, -4, -2) \end{cases} \\
 & x = \frac{(-4, -4, -2)}{(-4, -1, -12)} = \left( +1, \frac{1}{4}, \frac{1}{6} \right) = x
 \end{aligned}$$

سوال ترجمه شده مشکل داشت  
سورت سوال از کتاب انگلیسی  
نوشته شده است.

$$\begin{aligned}
 u &= (-1, 3, 2), v = (3, -4, 1) \\
 |u| &= \sqrt{1^2 + 3^2 + 2^2} = \sqrt{14} \\
 |v| &= \sqrt{3^2 + 4^2 + 1^2} = \sqrt{26} \\
 u_{\text{نرمال}} &= \left( -\frac{1}{\sqrt{14}}, \frac{3}{\sqrt{14}}, \frac{2}{\sqrt{14}} \right) \\
 v_{\text{نرمال}} &= \left( \frac{3}{\sqrt{26}}, \frac{-4}{\sqrt{26}}, \frac{1}{\sqrt{26}} \right) \quad \text{Normalize } u \text{ and } v.
 \end{aligned}$$

a.  $u = (1, 1, 1), v = (2, 2, 4)$

b.  $u = (1, 1, 0), v = (-2, 2, 0)$

c.  $u = (1, 1, 1, 1), v = (2, 1, 0)$



6.2.5.11  
 a.  $U \cdot V = V \cdot U \Rightarrow (u_x, u_y, u_z) \cdot (v_x, v_y, v_z) = (v_x, v_y, v_z) \cdot (u_x, u_y, u_z)$  (1-3)

$u_x v_x + u_y v_y + u_z v_z = v_x u_x + v_y u_y + v_z u_z \checkmark \Rightarrow U \cdot V = V \cdot U$

b.  $U \cdot (V+W) = U \cdot V + U \cdot W \Rightarrow (u_x, u_y, u_z) \cdot (v_x + w_x, v_y + w_y, v_z + w_z) = (u_x v_x + u_x w_x) + (u_y v_y + u_y w_y) + (u_z v_z + u_z w_z)$

$\Rightarrow \underbrace{(u_x v_x + u_x w_x)}_I + \underbrace{(u_y v_y + u_y w_y)}_N + \underbrace{(u_z v_z + u_z w_z)}_M = (u_x(v_x + w_x) + u_y(v_y + w_y) + u_z(v_z + w_z))$  (1-3)

$I + N + M = (u_x v_x + u_x w_x) + (u_y v_y + u_y w_y) + (u_z v_z + u_z w_z) \checkmark$

$\Rightarrow U \cdot (V+W) = U \cdot V + U \cdot W$

c.  $K(U \cdot V) = (KU) \cdot V = U \cdot (KV)$

$K(u_x v_x + u_y v_y) = (K u_x + K u_y) \cdot V = U \cdot (K v_x + K v_y)$

$K u_x v_x + K u_y v_y = K u_x v_x + K u_y v_y = K u_x v_x + K u_y v_y \checkmark$

$\Rightarrow K(U \cdot V) = (KU) \cdot V = U \cdot (KV)$

d.  $V \cdot V = \|V\|^2$

$\Rightarrow V \cdot V = v_x v_x + v_y v_y + v_z v_z$

$= (\sqrt{v_x^2 + v_y^2 + v_z^2})^2$

$= \|V\|^2$

$\Rightarrow V \cdot V = \|V\|^2$

$A = (0, 0, 0), B = (0, 1, 1), C = (1, 1, 0)$

17

$U \times KU = 0 ?$

$U = (u_x, u_y, u_z)$

$KU = (K u_x, K u_y, K u_z)$

$\begin{vmatrix} i & j & k \\ u_x & u_y & u_z \\ K u_x & K u_y & K u_z \end{vmatrix} \Rightarrow$

$U \times KU \Rightarrow \text{حساب ضرب} \Rightarrow ((u_y \times K u_z) - (u_z \times K u_y)) - ((u_x \times K u_z) - (u_z \times K u_x)) + ((u_x \times K u_y) - (u_y \times K u_x))$

$\Rightarrow U \times KU = 0 \Rightarrow U \times KU = |U| K |U| \sin \theta \xrightarrow{K > 0} \sin \theta = 0 \Rightarrow \theta = 0^\circ$

(17-3)