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$$(C) - x^{10}$$



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$$(a) 13$$



٣-

$$(d) 2$$



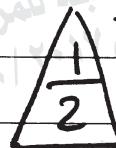
4-

$$\left| \begin{array}{ccc} a & b & c \\ b & a & c \\ b & c & a \end{array} \right| \quad C_1 \rightarrow C_1 + C_2 + C_3$$

$$= \left| \begin{array}{ccc} a+b+c & b & c \\ a+b+c & a & c \\ a+b+c & c & a \end{array} \right| = (a+b+c) \left| \begin{array}{ccc} 1 & b & c \\ 1 & a & c \\ 1 & c & a \end{array} \right|$$



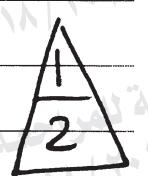
$$= (a+b+c) \left| \begin{array}{ccc} 1 & b & c \\ 0 & a-b & 0 \\ 0 & c-b & a-c \end{array} \right| \xrightarrow{R_3-R_1, R_2-R_1}$$



$$= (a+b+c)(a-b) \left| \begin{array}{ccc} 1 & b & c \\ 0 & 1 & 0 \\ 0 & c-b & a-c \end{array} \right| \xrightarrow{-(c-b)R_2+R_3}$$



$$= (a+b+c)(a-b)(a-c) \left| \begin{array}{ccc} 1 & b & c \\ 0 & 1 & 0 \\ 0 & 0 & a-c \end{array} \right|$$



$$= (a+b+c)(a-b)(a-c)$$

(تراعي الحلول الأخرى)

5-

$$(c) \sqrt{2} e^{-\frac{3}{4}\pi i}$$



6-

$$(d) \|\vec{A}\|^2 \|\vec{B}\|^2$$



7-

$$T_4 = 7 \Rightarrow 8C_3 x^3 = 7$$



$$\therefore x^3 = \frac{7}{56} = \frac{1}{8}$$



The order of the middle term = $\frac{8}{2} + 1 = 5$

The middle term is T_5



$$\frac{T_6}{T_5} = \frac{8-5+1}{5} \times \frac{x}{1} = \frac{4}{5} \times \frac{1}{2} = \frac{2}{5}$$



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• The two straight lines are parallel

• They have the same direction

∴ The direction vector = $(2, 4, 3)$



∴ The vector form:

$$\vec{r} = (-2, 3, 5) + t(2, 4, 3)$$



• The Parametric form:

$$\begin{aligned} x &= -2 + 2t \\ y &= 3 + 4t \\ z &= 5 + 3t \end{aligned}$$



• The Cartesian form:

$$\frac{x+2}{2} = \frac{y-3}{4} = \frac{z-5}{3}$$



(تراعي الحلول الأخرى)

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(a) ١



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$$\vec{n} \cdot \vec{r} = \vec{n} \cdot \vec{A}$$



$$(2, -3, 4) \cdot \vec{r} = (2, -3, 4) \cdot (1, -1, 4)$$

$$(2, -3, 4) \cdot \vec{r} = 21 \quad \text{The vector form.}$$

$$2(x-1) - 3(y+1) + 4(z-4) = 0$$



The standard form

$$2x - 3y + 4z - 21 = 0$$



The general equation.

11-

$$\begin{pmatrix} 1 & -2 & 0 \\ -1 & 1 & 2 \\ 1 & 0 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \\ -1 \end{pmatrix} \quad AX=B$$

$$|A| = \begin{vmatrix} 1 & -2 & 0 \\ -1 & 1 & 2 \\ 1 & 0 & -2 \end{vmatrix} = 1(-2) + 2(0) + 0 = -2 \neq 0$$

$$\text{Adj}(A) = \begin{pmatrix} -2 & 0 & -1 \\ -4 & -2 & 2 \\ -4 & -2 & -1 \end{pmatrix}^t = \begin{pmatrix} -2 & -4 & -4 \\ 0 & -2 & -2 \\ -1 & 2 & -1 \end{pmatrix}$$

$$A^{-1} = \frac{1}{|A|} \text{Adj}(A) = \frac{1}{-2} \begin{pmatrix} -2 & -4 & -4 \\ 0 & -2 & -2 \\ -1 & 2 & -1 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 2 & 4 & 4 \\ 0 & 2 & 2 \\ 1 & -2 & 1 \end{pmatrix} \begin{pmatrix} 5 \\ 0 \\ -1 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 6 \\ -2 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$$

$$x = 3, y = -1, z = 2$$

(تراعى الحلول الأخرى)

12-

$$(b) 5c_4 \times 8c_6 + 5c_5 \times 8c_5$$



13-

$$(b) 1$$



14-

$$(d) (3, 1, 2)$$



15-

$$\textcircled{a} Z = \frac{16}{1-\sqrt{3}i} \times \frac{1+\sqrt{3}i}{1+\sqrt{3}i} = \frac{16(1+\sqrt{3}i)}{1+3}$$

$$\therefore Z = 4 + 4\sqrt{3}i, |Z| = \sqrt{16+48} = 8$$

$$\tan \theta = \sqrt{3} \quad \therefore \theta = \frac{\pi}{3}$$



$$\therefore Z = 8 \left[\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right]$$



$$\therefore \sqrt[3]{Z} = 2 \left[\cos \frac{\frac{\pi}{3} + 2\pi n}{3} + i \sin \frac{\frac{\pi}{3} + 2\pi n}{3} \right], n=0,1,-1$$



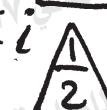
$$\text{at } n=0, \sqrt[3]{Z} = 2 \left(\cos \frac{\pi}{9} + i \sin \frac{\pi}{9} \right) = 2e^{\frac{\pi}{9}i}$$



$$\text{at } n=1, \sqrt[3]{Z} = 2 \left(\cos \frac{7\pi}{9} + i \sin \frac{7\pi}{9} \right) = 2e^{\frac{7\pi}{9}i}$$



$$\text{at } n=-1, \sqrt[3]{Z} = 2 \left(\cos \frac{-5\pi}{9} + i \sin \frac{-5\pi}{9} \right) = 2e^{-\frac{5\pi}{9}i}$$



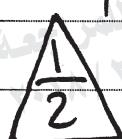
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$$\boxed{b} \quad \frac{1+10w+10w^2}{1-3w-3w^2} = \frac{1+10(w+w^2)}{1-3(w+w^2)}$$

$$= \frac{1-10}{1+3} = \frac{-9}{4}$$



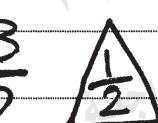
$$\therefore K^2 \ell^2 = \frac{-9}{4}$$



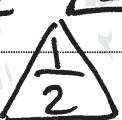
$$-K^2 = -\frac{9}{4} \Rightarrow K^2 = \frac{9}{4}$$



$$\therefore K = -\frac{3}{2}$$



$$\text{or } K = \frac{3}{2}$$



(تراعى الحلول الأخرى)

نسخة للطلبة للمراجعة
الدور الثاني ٢٠١٧ / ٢٠١٨

16-

(C) $r < 5$



17-

(b) 10



18-

(d) 41



19-

a) $\vec{AC} = \vec{C} - \vec{A} = (m-1, -1, 3-10m)$
 $\vec{AB} = \vec{B} - \vec{A} = (2, 3, 1)$

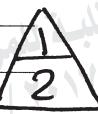
(i) $\because A, B$ and C are collinear

$\therefore \vec{AC} = k \vec{AB}$

$(m-1, -1, 3-10m) = k (2, 3, 1)$

$m-1 = 2k, -1 = 3k, 3-10m = k$

$\therefore k = -\frac{1}{3}$



$m-1 = -\frac{2}{3} \Rightarrow m = \frac{1}{3}$

(ii) $\because \vec{AB} \perp \vec{AC} \therefore \vec{AB} \cdot \vec{AC} = 0$

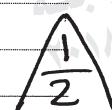
$(2, 3, 1) \cdot (m-1, -1, 3-10m) = 0$



$2m-2 - 3 + 3 - 10m = 0$

$-8m = 2$

$\therefore m = -\frac{1}{4}$



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$$\vec{BA} \parallel \vec{AB} = \vec{B} - \vec{A} = (3, 2, 3)$$

$$\vec{DC} = \vec{C} - \vec{D} = (3, 2, 3)$$

$$\vec{BC} = \vec{C} - \vec{B} = (-2, 2, 0)$$

$$\vec{AD} = \vec{D} - \vec{A} = (-2, 2, 0)$$

$$\therefore \vec{AB} = \vec{DC} \text{ and } \vec{BC} = \vec{AD}$$

$\therefore ABCD$ is a parallelogram



$$\therefore \vec{AB} \times \vec{AD} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & 2 & 3 \\ -2 & 2 & 0 \end{vmatrix} = -6\vec{i} - 6\vec{j} + 10\vec{k}$$

$$\therefore \|\vec{AB} \times \vec{AD}\| = \sqrt{36 + 36 + 100} = 2\sqrt{43}$$

\therefore Area of $ABCD = \|\vec{AB} \times \vec{AD}\| = 2\sqrt{43}$ area units

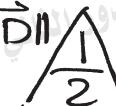


(iii) The perpendicular unit vector = $\frac{\vec{AB} \times \vec{AD}}{\|\vec{AB} \times \vec{AD}\|}$

$$\|\vec{AB} \times \vec{AD}\|$$

$$= \frac{(3, 2, 3) \times (-2, 2, 0)}{2\sqrt{43}}$$

$$= \frac{-6\vec{i} - 6\vec{j} + 10\vec{k}}{2\sqrt{43}}$$



$$= \left(\frac{-6}{2\sqrt{43}}, \frac{-6}{2\sqrt{43}}, \frac{10}{2\sqrt{43}} \right)$$



(تراعى الحلول الأخرى)

(انتهت الإجابة وتراعى الحلول الأخرى)