

Model answer

$$(1) {}^4C_1 + {}^5C_2 \quad (2) y = 0 \quad (3) -w \quad (4) (3, 1, 2)$$

$$(5) r = 6 \quad (6) \text{disjoin} \quad (7) -\frac{\pi}{2} \quad (8) 2$$

$$(9) \frac{T_5}{T_3} = \frac{T_3}{T_2} \Rightarrow \frac{n-3+1}{3} \times \frac{n-4+1}{4} x^2 = \frac{n-2+1}{2} \times$$

$$\frac{(n-2)(n-3)}{12} \times \left(\frac{9}{5}\right)^2 = \frac{n-1}{2} \times \frac{9}{5}$$

$$\frac{n^2-5n+6}{6} \times \frac{9}{5} = n-1 \therefore n = 7$$

$$(10) (a) \vec{d}_1 = \left(\frac{1}{2}, \frac{1}{3}, 1\right)$$

$$\vec{d}_2 = (-1, 1, 2) \quad \therefore \cos \theta = \frac{(\vec{d}_1 \cdot \vec{d}_2)}{\|\vec{d}_1\| \|\vec{d}_2\|} \quad \therefore \theta = 50^\circ$$

$$(11) \text{at } x = 1, d = 0$$

$$\begin{vmatrix} 0 & 1 & 1 \\ 1 & 1 & 2 \\ -1 & 1 & k+1 \end{vmatrix} = 0 \quad r_2 - r_1, r_3 - r_1 \quad \begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ k & 0 & -1 \end{vmatrix}$$

$$= r_3 + r_2 \begin{vmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 0 & k+1 \end{vmatrix} = 0$$

$$= - \begin{vmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & k+1 \end{vmatrix}$$

$$= -(k+1) = 0 \quad \therefore k = -1$$

$$(12) \pm 2$$

$$(13) 13$$

$$(14) |A| = -1 \neq 0$$

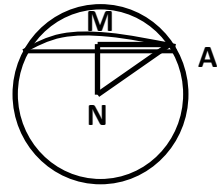
$$\therefore R(A) = R(A^*) = 3 \quad \therefore \text{one sol.}$$

$$\therefore X = 1, y = -2, z = 2$$

$$(15) \text{ center } N(-3, -2, 1), r = \sqrt{15} = AN$$

$$MN = 2, MA = \sqrt{15 - 4} = \sqrt{11}$$

$$\text{Area} = \pi r^2 = \pi \times (\sqrt{11})^2 = 11\pi \text{ unit area}$$



$$(16) 6$$

$$(17) i, -\frac{\sqrt{3}}{2} - \frac{1}{2}i$$

$$(18)(a) \vec{AB} = (1, 0, \sqrt{3}), \vec{M} = (3, 2, 2\sqrt{3})$$

$$\vec{v} \text{ comp} = \frac{\vec{AB} \cdot \vec{M}}{\|\vec{M}\|^2} = \left(\frac{27}{25}, \frac{18}{25}, \frac{18\sqrt{3}}{25} \right)$$

$$(b) \vec{A} \cdot \vec{B} \times \vec{c} = \begin{vmatrix} 3 & -4 & 1 \\ 0 & 2 & -3 \\ 3 & 2 & 2 \end{vmatrix} = 60$$

$$V = |60| = 60 \text{ unit volume.}$$

$$(19) (a) Z = e^{\theta i} = \cos \theta + i \sin \theta$$

$$\frac{1+z}{1-z} = \frac{1+\cos \theta + i \sin \theta}{1-\cos \theta - i \sin \theta}$$

$$|z| = \cot \frac{\theta}{2}, \text{ amp. } \frac{\pi}{2}$$

$$(b) \arg. (Z, Z_2^3) = 81^\circ \Rightarrow \theta_1 + 3\theta_2 = 81$$

$$\text{Arg} \left(\frac{z_1}{z_2} \right) = 33^\circ \Rightarrow \theta_1 - \theta_2 = 33^\circ$$

$$\theta_1 = 45^\circ, \theta_2 = 12.$$

$$(z_1, z_2)^{15} = \cos 135^\circ + i \sin 135^\circ$$

$$= -\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} i$$
