



MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

SCALER TRIPLE PRODUCTS

Dpp 2 3

1. Number of integral value(s) of λ for which vectors $x^2\hat{i} - \hat{j} + x\hat{k}$, $(\lambda - 1)\hat{i} - 2\lambda\hat{j} - \hat{k}$ and $\hat{i} - \hat{j} + \hat{k}$, in the order form right-handed system $\forall x \in \mathbb{R}$, is

(a) 0 (b) 2 (c) 4 (d) 6

A. 0

B. 2

C. 4

D. 6

Answer: A



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2. Let $\vec{a}, \vec{b}, \vec{c}$ be three linearly independent vectors, then

$$\frac{\left[\vec{a} + 2\vec{b} - \vec{c} \quad 2\vec{a} + \vec{b} + \vec{c} \quad 4\vec{a} - \vec{b} + 5\vec{c} \right]}{\left[\vec{a} \quad \vec{b} \quad \vec{c} \right]}$$

A. 0

B. 1

C. 2

D. -1

Answer: A



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3. If \vec{a}, \vec{b} are two unit vectors such that $\vec{a} + (\vec{a} \times \vec{b}) = \vec{c}$, where $|\vec{c}| = 2$, then value of $[\vec{a} \vec{b} \vec{c}]$ is

A. 0

B. ± 1

C. -3

D. 3

Answer: D



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4. Let \vec{a} and \vec{b} be unit vectors that are perpendicular to each other. Then $\left[\vec{a} + \left(\vec{a} \times \vec{b} \right) \vec{b} + \left(\vec{a} \times \vec{b} \right) \vec{a} \times \vec{b} \right]$ will always be equal to

A. 1

B. zero

C. -1

D. 3

Answer: A



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5. If V is the volume of the parallelepiped having three coterminous edges as \vec{a} , \vec{b} and \vec{c} , then the volume of the parallelepiped having three coterminous edges as

$$\vec{\alpha} = (\vec{a} \cdot \vec{a})\vec{a} + (\vec{a} \cdot \vec{b})\vec{b} + (\vec{a} \cdot \vec{c})\vec{c},$$

$$\vec{\beta} = (\vec{b} \cdot \vec{a})\vec{a} + (\vec{b} \cdot \vec{b})\vec{b} + (\vec{b} \cdot \vec{c})\vec{c}$$

$$\text{and } \vec{\lambda} = (\vec{c} \cdot \vec{a})\vec{a} + (\vec{c} \cdot \vec{b})\vec{b} + (\vec{c} \cdot \vec{c})\vec{c} \text{ is}$$

A. $3V$

B. $4V$

C. V^2

D. V^3

Answer: D



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6. A parallelepiped is formed by planes drawn parallel to coordinate axes through the points $A=(1,2,3)$ and $B=(9,8,5)$. The volume of that parallelepiped is equal to (in cubic units)

A. 192

B. 48

C. 32

D. 96

Answer: D



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7. If \vec{a} , \vec{b} and \vec{c} are any three vectors forming a linearly independent system, then $\forall \theta \in R$

$$\vec{p} = \vec{a} \cos \theta + \vec{b} \sin \theta + \vec{c} (\cos 2\theta)$$

$$\vec{q} = \vec{a} \cos \left(\frac{2\pi}{3} + \theta \right) + \vec{b} \sin \left(\frac{2\pi}{3} + \theta \right) + \vec{c} (\cos 2) \left(\frac{2\pi}{3} + \theta \right)$$

and

$$\vec{r} = \vec{a} \cos \left(\theta - \frac{2\pi}{3} \right) + \vec{b} \sin \left(\theta - \frac{2\pi}{3} \right) + \vec{c} \cos 2 \left(\theta - \frac{2\pi}{3} \right)$$

then $\left[\vec{p} \vec{q} \vec{r} \right]$

A. $\left[\vec{a} \vec{b} \vec{c} \right] \cos \theta$

B. $\left[\vec{a} \vec{b} \vec{c} \right] \cos 2\theta$

C. $\left[\vec{a} \vec{b} \vec{c} \right] \cos 3\theta$

D. None of these

Answer: D



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8. Let $\vec{r} = \left(\vec{a} \times \vec{b} \right) \sin x + \left(\vec{b} \times \vec{c} \right) \cos y + \left(\vec{c} \times \vec{a} \right)$, where \vec{a} , \vec{b} and \vec{c} are non-zero non-coplanar vectors, If \vec{r} is orthogonal to $3\vec{a} + 5\vec{b} + 2\vec{c}$, then the value of $\sec^2 x + \operatorname{cosec}^2 x + \sec y \operatorname{cosec} y$ is

A. 3

B. 4

C. 5

D. 6

Answer: A



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9. In a regular tetrahedron, let θ be angle between any edge and a face not containing the edge. The value of $\cos^2 \theta$ is

A. $1/6$

B. $1/9$

C. $1/3$

D. None of these

Answer: C

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10. DABC be a tetrahedron such that AD is perpendicular to the base ABC and $\angle ABC = 30^\circ$. The volume of tetrahedron is 18. if value of $AB + BC + AD$ is minimum, then the length of AC is

A. $6\sqrt{2 - \sqrt{3}}$

B. $3(\sqrt{6} - \sqrt{2})$

C. $6\sqrt{2 + \sqrt{3}}$

D. $3(\sqrt{6} + \sqrt{2})$

Answer: A

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11. If $\alpha(\vec{a} \times \vec{b}) + \beta(\vec{b} \times \vec{c}) + \lambda(\vec{c} \times \vec{a}) = 0$, then

A. $\vec{a}, \vec{b}, \vec{c}$ are coplanar if all $\alpha, \beta, \lambda \neq 0$

B. $\vec{a}, \vec{b}, \vec{c}$ are coplanar if any one of $\alpha, \beta, \lambda \neq 0$

C. $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar for any $\alpha, \beta, \lambda \neq 0$

D. None of these

Answer: A::B



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