MATHS

BOOKS - ACCURATE PUBLICATION

SAMPLE QUESTION PAPER-II

Section A

1. If $A = \{a, b, c, d\}$ then a relation $R = \{(a, a), (b, b), (c, c), (d, d)\}$ on A is :

A. Symmetric

B. Transitive

C. Reflexive

D. None of these

Answer: C

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2. The value of $\operatorname{cosec}^{-1}(-2)$ is equal to :

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{6}$

C. $-\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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3. If AB = C where A is a matrix of order 2×4 and C is a matrix of order 2×5, then the order of B is :

A. 3×5

B. 4×5

C. 3×3

D. 5×5

Answer: B

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4. The number of all possible matrices of order 3×3 with each entry 0 or 1 is:

A. 27

B. 18

C. 81

D. 512

Answer: D

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5. If $A = [[321]]$, then AA' is equal to :

A. $\begin{pmatrix} 9 & 4 & 1 \end{pmatrix}$

B. $\begin{pmatrix} 9 \\ 4 \\ 1 \end{pmatrix}$

C. -14

D. -6

Answer: C

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6. If $f(x) = \begin{cases} \frac{\sin 5x}{2x} & x \neq 0 \\ k & x = 0 \end{cases}$ is continuous at x = 0 then value of k is :

A. 5

B. $\frac{3}{5}$

C. $\frac{5}{3}$

D. 0

Answer: B

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7. If $y = 3^x$, then $\frac{dy}{dx}$ is :

A. 3^x

B. $3^x \log 3$

C. 3

D. $\frac{3^x}{\log 3}$

Answer: B

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8. If $y = \tan x$ then at $x = 0$, y_2 is equal to :

A. -1

B. 1

C. 0

D. $\frac{1}{2}$

Answer: C

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9. $\int \frac{\sin x}{\cos^2 x} dx$ equals :

A. sec x + c

B. tan x + c

C. cosec x + c

D. $\sec^2 x + c$

Answer: A

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10. $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$ is equal to :

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{6}$

Answer: C

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11. The number of arbitrary constants in the particular solution of a differential equation of fifth order is :

A. 0

B. 2

C. 3

D. 5

Answer: A

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12. The Integrating Factor of the differentiate equation $\frac{dy}{dx} - 2y = 3x$ is :

A. e^{2x}

B. e^{-2x}

C. e^{x}

D. 2x

Answer: B

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13. If $\vec{a} = \hat{i} + 2\lambda\hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} - 3\hat{k}$ are perpendicular to each other, the value of λ is :

A. 0

B. 1

C. 2

D. $\frac{1}{2}$

Answer: D

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14. If θ is the angle between any two vectors $\vec{a}$ and $\vec{b}$, then $\left|\vec{a}.\vec{b}\right| = \left|\vec{a} \times \vec{b}\right|$ when θ is equal to :

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. π

Answer: B

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15. The distance of the plane $\vec{r}.\left(2\hat{i}+3\hat{j}-6\hat{k}\right)=7$ from origin is :

A. -1

B. 0

C. $\frac{1}{7}$

D. 1

Answer: D

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16. In a single throw of two dice, the chances of throwing a sum of 5 is :

A. 0

B. $\frac{1}{36}$

C. $\frac{1}{9}$

D. $\frac{5}{36}$

Answer: C

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17. If f is a bijection, then it is.....

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18. If |A| = 3. where A is a 2×2 matrix, |Adj A| = ...

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19. $\frac{d}{dx}\left(x^2+2x+5\right)^2$ = ...

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20. The slope of tangent to the curve $y = 2 - x^2$ at x = 1 is

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21. The value of $\int_{-\pi}^{\pi} \sin^{2019} x \cos^{2020} x dx$ is equal to.....

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22. Degree of differential equation $\left(\frac{dy}{dx}\right)^3 + \frac{d^3y}{dx^3} = 5$ is .....

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23. The distance between the planes $3x + 2y - 6z - 18 = 0$ and $3x + 2y - 6z + 10 = 0$ is

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24. If A and B are mutually exclusive, then $P(A \cap B)$ is equal to _____.

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25. The value of the expressions $\left(\cos^{-1} x\right)^2$ is equal to $\sec^2 x$.

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26. $\left(A^3\right)^{-1} = \left(A^{-1}\right)^3$, where A is a square matrix and $|A| \neq 0$.

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27. Derivative of $\sin^{-1}(\cos x)$ w.r.t. x is 1

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28. $prove: \int \frac{\sin^2 x}{1+\cos x} dx = x + \sin x + c.$

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29. If $\vec{a} = \hat{i} + 4\hat{j} + 4\hat{k}$ and $\vec{b} = 4\hat{i} - \hat{j} + 2\hat{k}$, then $\vec{a} . \vec{b}$ is equal to 8.

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30. If cos α , cos β , cos γ are the direction-cosines of a line, then the value of

$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma$ is _____ .

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31. Quadrant represented by the region $x \geq 0, y \geq 0$ is first.

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32. If A and B are two events such that $P(A) > 0$ and $P(A) + P(B) > 1$, then $\mathrm{P}(B \mid A) \geq 1 - \frac{P(B')}{P(A)}$

.

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33. If $A = \{a, b, c, d\}$ then a relation $R = \{(a, a), (b, b), (c, c), (d, d)\}$ on A is :

A. Symmetric

B. Transitive

C. Reflexive

D. None of these

Answer: C

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34. Principal value of `cosec^-1 (2) is :

A. $\frac{\pi}{3}$

B. $-\frac{\pi}{6}$

C. $-\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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35. If AB = C where A is a matrix of order 2×3 and C is a matrix of order 2×5, then the order of B is :

A. 3×5

B. 4×5

C. 3×3

D. 5×5

Answer: B

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36. The number of all possible matrices of order 3×3 with each entry 0 or 1 is:

A. 27

B. 18

C. 81

D. 512

Answer: D

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37. If $A = [[321]]$, then AA' is equal to :

A. $\begin{pmatrix} 9 & 4 & 1 \end{pmatrix}$

B. $\begin{pmatrix} 9 \\ 4 \\ 1 \end{pmatrix}$

C. -14

D. -6

Answer: C

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38. If $f(x) = \begin{cases} \frac{\sin 5x}{2x} & x \neq 0 \\ k & x = 0 \end{cases}$ is continuous at x = 0 then value of k is :

A. 5

B. $\frac{3}{5}$

C. $\frac{5}{3}$

D. 0

Answer: B

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39. If $y = 3^x$, then $\frac{dy}{dx}$ is :

A. 3^x

B. $3^x \log 3$

C. 3

D. $\frac{3^x}{\log 3}$

Answer: B

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40. If $y = \tan x$ then at $x = 0$, y_2 is equal to :

A. -1

B. 1

C. 0

D. $\frac{1}{2}$

Answer: C

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41. $\int \frac{\sin x}{\cos^2 x} dx$ equals :

A. sec x + c

B. tan x + c

C. cosec x + c

D. $\sec^2 x + c$

Answer: A

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42. $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$ is equal to :

A. $\frac{\pi}{4}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{6}$

Answer: C

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43. The number of arbitrary constants in the particular solution of a differential equation of fifth order is :

A. 0

B. 2

C. 3

D. 5

Answer: A

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44. The Integrating Factor of the differentiate equation $\frac{dy}{dx} - 2y = 3x$ is :

A. e^{2x}

B. e^{-2x}

C. e^{x}

D. 2x

Answer: B

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45. If $\vec{a} = \hat{i} + 2\lambda\hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} - 3\hat{k}$ are perpendicular to each other, the value of λ is :

A. 0

B. 1

C. 2

D. $\frac{1}{2}$

Answer: D

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46. If θ is the angle between any two vectors $\vec{a}$ and $\vec{b}$, then $\left|\vec{a} . \vec{b}\right| = \left|\vec{a} \times \vec{b}\right|$ when θ is equal to :

A. 0

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. π

Answer: B

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47. The distance of the plane $\vec{r}.\left(2\hat{i}+3\hat{j}-6\hat{k}\right)=7$ from origin is :

A. -1

B. 0

C. $\frac{1}{7}$

D. 1

Answer: D

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48. In a single throw of two dice, the chances of throwing a sum of 5 is :

A. 0

B. $\frac{1}{36}$

C. $\frac{1}{9}$

D. $\frac{5}{36}$

Answer: C

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49. If f is a bijection, then it is.....

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50. If |A| = 3. where A is a 2×2 matrix, |Adj A| = ...

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51. $\frac{d}{dx}\left(x^2+2x+5\right)^2$ = ...

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52. The slope of tangent to the curve $y = 2 - x^2$ at x = 1 is

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53. The value of $\int_{-\pi}^{\pi} \sin^{2019} x \cos^{2020} x dx$ is equal to.....

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55. The distance between the planes $3x + 2y - 6z - 18 = 0$ and $3x + 2y - 6z + 10 = 0$ is

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56. If A and B are mutually exclusive, then $P(A \cap B)$ is equal to _____.

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57. The value of the expressions $\left(\cos^{-1} x\right)^2$ is equal to $\sec^2 x$.

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58. $\left(A^3\right)^{-1} = \left(A^{-1}\right)^3$, where A is a square matrix and $|A| \neq 0$.

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59. Derivative of $\sin^{-1}(\cos x)$ w.r.t. x is 1

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60. *prove* : $\int \frac{\sin^2 x}{1+\cos x} dx = x + \sin x + c.$

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61. If $\vec{a} = \hat{i} + 4\hat{j} + 4\hat{k}$ and $\vec{b} = 4\hat{i} - \hat{j} + 2\hat{k}$, then $\vec{a} . \vec{b}$ is equal to 8.

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62. If a line makes angles α, β, γ respectively with positive directions of the coordinate axes, then the value of $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1.$

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63. Quadrant represented by the region $x \geq 0, y \geq 0$ is first.

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64. If A and B are two events such that $P(A) > 0$ and $P(A) + P(B) > 1$, then $\mathrm{P}(B \mid A) \geq 1 - \frac{P(B')}{P(A)}$.

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Section B

1. If $A = \begin{bmatrix} -2 & 4 \\ -1 & 3 \end{bmatrix}$, then find A'A.

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2. If $A = \begin{bmatrix} 1 & -2 \\ 3 & 2 \end{bmatrix}$ and $f(x) = x^2 - 2x + 3$, then find f(A).

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3. Find the equation of the tangent to the curve $y = 2x^2 + 3\sin x$ at x = 0.

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4. Show that the function f given by $f(x) = x^3 - 3x^2 + 4x, x \in R$ is strictly increasing on R.

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5. Evaluate : $\int \sin 5x \sin 3x dx.$

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6. Using integration, find the area of the region bounded by the curve $x^2 + y^2 = 16$ in the first quadrant.

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7. Find a vector in direction of vector $4\hat{i} - \hat{j} + 3\hat{k}$ which has magnitude 7 units.

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8. If $\vec{a} + \vec{b} + \vec{c} = 0$ and $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 5, \left|\vec{c}\right| = 7$, find the angle between $\vec{a}$ and $\vec{b}$.

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9. If $A = \begin{bmatrix} -2 & 4 \\ -1 & 3 \end{bmatrix}$, then find A'A.

Watch Video Solution

10. If $A = \begin{bmatrix} 1 & -2 \\ 3 & 2 \end{bmatrix}$ and $f(x) = x^2 - 2x + 3$, then find f(A).

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15. Find a vector in direction of vector $4\hat{i} - \hat{j} + 3\hat{k}$ which has magnitude 7 units.

Watch Video Solution

16. If $\vec{a} + \vec{b} + \vec{c} = 0$ and $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 5, \left|\vec{c}\right| = 7$, find the angle between $\vec{a}$ and $\vec{b}$.

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Section C

1. Show that $\sin^{-1}\left(\frac{12}{13}\right) + \cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{63}{16}\right) = \pi$

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2. Differentiate : $x^{\sin x} + (\sin x)^x w.r.tx$:

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3. If $y = e^{\tan^{-1} x}$, then prove that $\left(1 + x^2\right) y_2 + (2x - 1) y_1 = 0$

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4. Evaluate : $\int \frac{(x-4)e^x}{(x-2)^3} dx.$

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5. Evaluate : $\int \frac{1}{(x-1)(x+2)(x-3)} dx.$

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6. Solve the differential equation:

$$\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dx}{dy} = 1, (x \neq 0)$$

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7. An insurance company insured 3000 scooters, 4000 cars and 5000 trucks. The probabilities of an accident involving a scooter, a car and a truck are 0.02, 0.03, 0.04 respectively. One of the insured vehicles meets with an accident. Find the probability that it is a car.

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8. The probability of getting an ace froma well shuffled deck of 52 playing cards.

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9. Show that $\sin^{-1}\left(\frac{12}{13}\right)+\cos^{-1}\left(\frac{4}{5}\right)+\tan^{-1}\left(\frac{63}{16}\right)=\pi$

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10. Differentiate : $x^{\sin x}+(\sin x)^{x} w.\ r.\ tx$:

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11. If $y=e^{\tan^{-1}x}$, then prove that $\left(1+x^{2}\right)y_{2}+(2x-1)y_{1}=0$

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12. Evaluate : $\int \frac{(x-4)e^x}{(x-2)^3} dx.$

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13. Evaluate : $\int \frac{1}{(x-1)(x+2)(x-3)} dx.$

Watch Video Solution

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$$\left[\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right]\frac{dx}{dy} = 1, (x \neq 0)$$

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15. An insurance company insured 3000 scooters, 4000 cars and 5000 trucks. The probabilities of an accident involving a scooter, a car and a truck are 0.02, 0.03, 0.04 respectively. One of the insured vehicles meets with an accident. Find the probability that it is a car.

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16. Find the probability distribution of number of aces, when two cards are drawn (with replacement) at random from a well-shuffled pack of 52 cards.

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Section D

1. Using matrix method, solve the following system of equations

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

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2. If $A = \begin{bmatrix} 3 & 4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$ find A^{-1} and hence solve the equations

$3x + 4y + 2z = -1, 2x + 3y + 5z = 7, x + z = 2.$

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3. Find the equation of the plane passing through the line of intersection of the planes $2x + y - z = 3$ and $5x - 3y + 4z = 9$ and parallel to the lines $\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-5}{5}$

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4. Find the shortest distance between the lines given by

$\vec{r} = 3\hat{i} + 8\hat{j} + 3\hat{k} + \lambda\left(3\hat{i} - \hat{j} + \hat{k}\right)$ and

$\vec{r} = -3\hat{i} - 7\hat{j} + 6\hat{k} + \mu\left(-3\hat{i} + 2\hat{j} + 4\hat{k}\right).$

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5. Graphically maximize Z = 5x + 2y subject to the constraints :

$x - 2y \leq 2, 3x + 2y \leq 12, -3x + 2y \leq 3, x \geq 0, y \geq 0$

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6. Solve the following L.P.P graphically :

Maximise Z = 20x + 10y

subject to the costraints

$x + 2y \leq 28$

$3x + y \leq 24$

$x \geq 2$

$x, y \geq 0$

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7. Using matrix method, solve the following system of equations

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

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8. If $A = \begin{bmatrix} 3 & 4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$ find A^{-1} and hence solve the equations

$3x + 4y + 2z = -1, 2x + 3y + 5z = 7, x + z = 2.$

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9. Find the equation of the plane passing through the line of intersection of the planes $2x + y - z = 3$ and $5x - 3y + 4z + 9 = 0$ and parallel to the line $\frac{x-1}{2} = \frac{y-3}{4} = \frac{5-z}{-5}$

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10. Find the shortest distance between the lines given by $\vec{r} = 3\hat{i} + 8\hat{j} + 3\hat{k} + \lambda\left(3\hat{i} - \hat{j} + \hat{k}\right)$ and $\vec{r} = -3\hat{i} - 7\hat{j} + 6\hat{k} + \mu\left(-3\hat{i} + 2\hat{j} + 4\hat{k}\right).$

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11. Graphically maximize Z = 5x + 2y subject to the constraints :

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