**MATHEMATICS** **SET– A**

1. The projection of $(\hat{i} - \hat{j})$ on $(\hat{i} + \hat{j})$ is

   (A) 0 (B) 1

   (C) $-1$ (D) 2

2. The ratio in which the join of the point A(2, –1, 3) and B(4, 3, 1) is divided by the point $C\left(\frac{20}{7}, \frac{5}{7}, \frac{15}{7}\right)$ is

   (A) 4 : 3 (B) 3 : 4

   (C) 1 : 2 (D) 3 : 5

3. The integral $\int_0^{\pi/2} \frac{\sqrt{\tan x}\, dx}{\sqrt{\tan x} + \sqrt{\cot x}}$ has the value

   (A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$

   (C) $\frac{\pi}{3}$ (D) 0

4. Solution of the differential equation $\frac{dx}{x} + \frac{dy}{y} = 0$ is

   (A) $xy = C$ (B) $\log x \log y = C$

   (C) $x + y = C$ (D) $\frac{1}{x} + \frac{1}{y} = C$

5. If $P(C \cap D) = \frac{1}{2}$, $P(C' \cap D') = \frac{1}{3}$, P(C) = p and P(D) = 2p, then the value of p is

   (A) $\frac{7}{18}$ (B) $\frac{1}{3}$

   (C) $\frac{4}{7}$ (D) $\frac{1}{9}$

6. The function of $2x^3 - 3x^2 - 12x + 4$ has

(A) Two maxima

(B) Two minima

(C) No maximum and no minimum

(D) One maximum and one minimum

7. The tangents to the curve $y = x^3$ at $x = -1$ and $x = 1$ are

(A) Intersecting obliquely

(B) Perpendicular to each other

(C) Parallel

(D) None of these

8. The value of the integral $\int \frac{\sin 4x}{\cos 2x} dx$ is

(A) $\sin 4x + C$

(B) $-\sin 2x + C$

(C) $-\cos 2x + C$

(D) $\cos 4x + C$

9. Equation of a vertical line on left hand side of the $x$-axis at a distance '$a$' from it is

(A) $x = a$

(B) $x = 0$

(C) $x = -a$

(D) $x = 1$

10. The principal value of $\tan^{-1}\sqrt{3} - \cot^{-1}(-\sqrt{3})$ is

(A) $\frac{-\pi}{2}$

(B) $\frac{\pi}{2}$

(C) $\frac{2\pi}{3}$

(D) $\frac{\pi}{6}$

11. The next term of the sequence $\sqrt{3}, \sqrt{12}, \sqrt{27}, \sqrt{48}$ is

(A) $\sqrt{75}$

(B) $\sqrt{70}$

(C) $\sqrt{65}$

(D) $\sqrt{60}$



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12. If $n$ and $r$ are positive integers such that $1 \le r \le n$ then ${}^{n}C_{r} + {}^{n}C_{r-1}$ is equal to

(A) ${}^{n}C_{r+1}$ (B) ${}^{n-1}C_{r}$

(C) ${}^{n+1}C_{r}$ (D) ${}^{n+1}C_{r-1}$

13. The value of $p$ for which $p(\hat{i} + \hat{j} + \hat{k})$ is a unit vector is

(A) $\pm 3$ (B) 2

(C) 1 (D) $\pm \frac{1}{\sqrt{3}}$

14. The number of ways in which 5 boys and 3 girls can be seated in a row so that no two girls are together is

(A) 2000 (B) 14000

(C) 14300 (D) 14400

15. If $\vec{a}$ and $\vec{b}$ are unlike vectors, then $\vec{a}.\vec{b}$ is

(A) $ab$ (B) 0

(C) $-ab$ (D) 1

16. Direction cosines of vector $2\hat{i} - 3\hat{j}$ are

(A) $(2, -3, 0)$ (B) $\left(\frac{2}{\sqrt{13}}, \frac{-3}{\sqrt{13}}, 0\right)$

(C) $\left(\frac{2}{13}, \frac{-3}{13}, 0\right)$ (D) $(-2, 3, 0)$

17. The integral $\int_{0}^{\pi/2} \sin x \sin 2x \, dx$ has the value

(A) $\frac{1}{2}$ (B) $\frac{2}{3}$

(C) $\frac{2}{5}$ (D) $\frac{3}{4}$

18. If $\frac{dy}{dx} = e^{-2y}$ and $y = 0$ when $x = 5$, then the value of $x$ when $y = 3$ is

(A) $e^5$ (B) $e^6 + 1$

(C) $\frac{e^6 + 9}{2}$ (D) $\log_e 6$

19. $I_n$ is an identity matrix of order n, then $(I_n)^{-1}$ is equal to

(A) 0 (B) $nI_n$

(C) $I_n$ (D) Does not exist

20. $\begin{vmatrix} a-b & b-c & c-a \\ x-y & y-z & z-x \\ p-q & q-r & r-p \end{vmatrix}$ is equal to

(A) 1 (B) $-1$

(C) 0 (D) $-2$

21. Domain of $\sqrt{a^2 - x^2}$ $(a > 0)$ is

(A) $(-a, a)$ (B) $[-a, a]$

(C) $(0, a)$ (D) $(-a, 0]$

22. If a, b, c are in Arithmetic progression, then

(A) $a^2 + c^2 + 6abc = 8b^3$ (B) $a^3 + c^3 + 6abc = 8b^2$

(C) $a^3 + c^3 + 6abc = 8b^3$ (D) $a + c + 6abc = 8b^3$

23. The value of $\cos\phi + \sin(270° + \phi) - \sin(270° - \phi) + \cos(180° + \phi)$ is

(A) 0 (B) 1

(C) $-1$ (D) 2



*Contd.*

24. $\frac{\cos^3\phi - \cos 3\phi}{\cos\phi} + \frac{\sin^3\phi + \sin 3\phi}{\sin\phi}$ is equal to

(A) 1 (B) 3

(C) 5 (D) 0

25. If $\tan Ø = \frac{a}{b}$, then $b\cos 2Ø + a\sin 2Ø$ is equal to

(A) $a$ (B) $b$

(C) $\frac{b}{a}$ (D) $\frac{a}{b}$

26. The distance between the line $3x - 4y + 9 = 0$ and $6x - 8y - 17 = 0$ is

(A) $\frac{7}{4}$ units (B) $\frac{7}{3}$ units

(C) $\frac{7}{2}$ units (D) $\frac{7}{5}$ units

27. The value of the integral $\int \frac{\cos 2x}{\sqrt{1+\cos 4x}}\,dx$ is

(A) $\frac{-\sin 2x}{2} + C$ (B) $\frac{x}{\sqrt{2}} + C$

(C) $\frac{x^2}{\sqrt{2}} + C$ (D) $\frac{\cos 2x}{2} + C$

28. A can hit a target 4 times in 5 shots, B can hit 3 times in 4 shots, and C can hit 2 times in 3 shots. Then, the probability that A,B and C hit the target is

(A) $\frac{1}{5}$ (B) $\frac{2}{5}$

(C) $\frac{4}{6}$ (D) $\frac{3}{6}$

29. If a random variable X follows a binomial distribution with mean 4 and variance 2, then its distribution function $P(X = r)$ is

(A) $^6C_r\left(\frac{1}{4}\right)^{6-r}$ (B) $^8C_r\left(\frac{1}{4}\right)^{8-r}$

(C) $^8C_r\left(\frac{1}{2}\right)^{8}$ (D) $^6C_r\left(\frac{1}{2}\right)^{6-r}$

30. Unit vector normal to the plane $3x-6y+2z=7$ is

(A) $\frac{1}{7}(3\hat{i}-6\hat{j}+2\hat{k})$ (B) $\frac{1}{11}(3\hat{i}-6\hat{j}+2\hat{k})$

(C) $\frac{1}{7}(\hat{i}-\hat{j}+\hat{k})$ (D) $\frac{1}{3}(\hat{i}-\hat{j}+\hat{k})$

31. A couple has 2 children. If it is known that one of the children is a boy, then the probability that both are boys is

(A) $\frac{1}{3}$ (B) $\frac{2}{5}$

(C) $\frac{3}{5}$ (D) $\frac{2}{3}$

32. The value of $k$ for which the lines $\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y-2}{1}=\frac{z-3}{5}$ are perpendicular to each other is

(A) $\frac{10}{7}$ (B) $\frac{5}{7}$

(C) $\frac{4}{7}$ (D) $\frac{3}{7}$

33. If $e^x + e^y = e^{x+y}$, then $\frac{dy}{dx}$ is equal to

(A) $-e^{y-x}$ (B) $e^x$

(C) $e^y$ (D) $-e^{x-y}$



*Contd.*

34. A binary operation $*$ is defined by $a * b = a + b + 1$ $\forall$ $a, b \in Z$. The identity element of $*$ in Z is given by

(A) 0 (B) 1

(C) $-1$ (D) 2

35. The range of the function $\sin(\sin^{-1}x + \cos^{-1}x)$, $|x| \leq 1$ is

(A) $[-1, 1]$ (B) $(-1, 1)$

(C) $\{-1, 1\}$ (D) $\{1\}$

36. Two dice are thrown. The odds in favour of getting the sum 7 is

(A) 5 : 1 (B) 5 : 31

(C) 1 : 5 (D) 31 : 5

37. If $y = \frac{3^x}{x^3}$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{3^x \log 3}{x^3}$ (B) $\frac{3^x}{x^3}\left(1 - \frac{3}{x}\right)$

(C) $\frac{3^x}{x^3}\left(\log 3 - \frac{3}{x}\right)$ (D) $\frac{3^x}{x^3}\left(\frac{3}{x} - \log 3\right)$

38. If $X + Y = \begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$, then Y is equal to

(A) $\begin{bmatrix} -1 & 2 \\ 0 & -5 \end{bmatrix}$ (B) $\begin{bmatrix} 8 & 8 \\ 0 & 8 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & -4 \\ 0 & 10 \end{bmatrix}$ (D) $\begin{bmatrix} 1 & -2 \\ 0 & 5 \end{bmatrix}$

39. If $\lim_{x \to 0} \frac{1-\cos mx}{1-\cos 5x} = 4,$ then the value of $m$ is

(A) 5 (B) 10

(C) 8 (D) 4

40. For any sets A, B and C, $(A \cap B')' \cup (B \cap C)$ is equal to

(A) $A' \cup B \cup C$ (B) $A' \cup B$

(C) $A' \cup C'$ (D) $A' \cap B$

41. The complex number $\frac{-16}{1+i\sqrt{3}}$ lies in quadrant

(A) I (B) II

(C) III (D) IV

42. The integral $\int \sqrt{1-\sin 2x}\, dx$ has the value

(A) $\cos 2x + C$ (B) $\sin x \cos x + C$

(C) $\sin x + \cos x + C$ (D) $\sin x - \cos x + C$

43. If 2, x, y, z, $\frac{32}{81}$ are in G.P, then the value of x, y and z are respectively

(A) $\frac{4}{3}, \frac{8}{9}, \frac{16}{27}$ (B) $\frac{1}{3}, \frac{8}{9}, \frac{16}{27}$

(C) $\frac{4}{3}, \frac{7}{9}, \frac{8}{27}$ (D) $\frac{4}{3}, \frac{8}{9}, \frac{13}{27}$

44. The length of the perpendicular from the point $(a, b)$ to the line $\frac{x}{a} + \frac{y}{b} = 1$ is

(A) $\frac{|ab|}{\sqrt{a^2 - b^2}}$ (B) $\frac{|ab|}{\sqrt{a^2 + b^2}}$

(C) $\frac{|(ab)^2|}{\sqrt{a^2 - b^2}}$ (D) $\frac{|(ab)^3|}{\sqrt{a^2 + b^2}}$

45. The total number of 9 digit numbers which have all different digits is

(A) 10! (B) 9!

(C) $9 \times 9!$ (D) $10 \times 10!$

46. The value of the integral $\int \cos\left\{2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right\} dx$ is

(A) $\sin^{-1}(\log x) + C$ (B) $\log\frac{1-x}{1+x} + C$

(C) $\cot^{-1} x + C$ (D) $\frac{1}{2}x^2 + C$

47. If $\vec{a}$ is a unit vector such that $(\vec{x} - \vec{a}).(\vec{x} + \vec{a}) = 3$, then the value of $|\vec{x}|$ is

(A) 2 (B) 1

(C) 0 (D) 3

48. The value of $p$ for which $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} + p\hat{j} - 3\hat{k}$ are perpendicular to each other is

(A) $-7$ (B) 1

(C) $-9$ (D) 2

49. A die is rolled. If the outcome is an even number, then the probability that it is a number greater than 2 is

(A) $\frac{2}{3}$ (B) $\frac{1}{4}$

(C) $\frac{1}{3}$ (D) $\frac{2}{5}$

50. A die is rolled 30 times. Getting a number greater than 4 is a success. Then, mean of the number of successes is

(A) 12 (B) 14

(C) 10 (D) 15

51. Perpendicular distance of the point (2, 3, 7) from the plane $3x - y - z = 7$ is

(A) 7 (B) 5

(C) $\sqrt{8}$ (D) $\sqrt{11}$

52. $\int_{-\pi}^{\pi} x^{12} \sin^9 x \, dx$ equals to

(A) 0 (B) 1

(C) $\frac{3}{2}$ (D) $\frac{1}{2}$

53. $\int_0^1 \frac{1}{e^x + e^{-x}} \, dx$ is equal to

(A) 0 (B) $\tan^{-1} e - \frac{\pi}{4}$

(C) $e^2$ (D) $2e^2$

54. $y = A\cos 4x + B\sin 4x$, then $\frac{d^2y}{dx^2}$ is equal to

(A) $y$ (B) $16y$

(C) $-y$ (D) $-16y$

55. $\begin{vmatrix} a & b & c \\ m & n & p \\ x & y & z \end{vmatrix} = K$, then $\begin{vmatrix} 6a & 3b & 3c \\ 2m & n & p \\ 2x & y & z \end{vmatrix}$ is equal to

(A) $\frac{K}{6}$ (B) $2K$

(C) $3K$ (D) $6K$

56. If $y = \frac{\cos x - \sin x}{\cos x + \sin x}$, then

(A) $\frac{dy}{dx} + y + 1 = 0$ (B) $\frac{dy}{dx} + y^2 + 1 = 0$

(C) $\frac{dy}{dx} + y^2 - 1 = 0$ (D) $\frac{dy}{dx} + y - 1 = 0$

57. The system of equations $x + 2y = 11;\ -2x - 4y = 22$ has

(A) Only one solution (B) Finitely many solutions

(C) No solution (D) Infinitely many solutions

58. Integrating factor of the differential equation $\frac{dy}{dx} - 3y \cot x = \sin 2x$ is

(A) $\sin^3 x$ (B) $\text{cosec}^3 x$

(C) $\cos^3 x$ (D) $\sec^3 x$

59. Let $f(x) = \begin{cases} 3x-4 \text{ for } 0 \le x \le 2 \\ 2x+\lambda \text{ for } 2 < x \le 3 \end{cases}$

If $f(x)$ is continuous at $x = 2$, then $\lambda$ is is equal to

(A) $-2$ (B) $-1$

(C) 0 (D) 2

60. If A= {1,3,5,7,9,11,13,15,17}, B={2,4,6,….,18} and N,the set of natural numbers, is the universal set then A' $\cup$ {(A $\cup$ B) $\cap$ B'} is

(A) $\phi$ (B) N

(C) A (D) B

61. The middle term in the expansion of $(1+x)^{2n}$ is

(A) ${}^{2n}C_n$ (B) ${}^{2n}C_{n+1}x^{n+1}$

(C) ${}^{2n}C_{n-1}x^{n-1}$ (D) $\frac{1.3.5.....(2n-1).2^n.x^n}{n!}$

62. If a, b, c are in G.P and $a^{1/x} = b^{1/y} = c^{1/z}$, then x, y, z are in

(A) G.P (B) A.P

(C) Neither A.P nor G.P (D) None of these

63. Every equation of the form $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle if

(A) $g^2 + f^2 + c = 0$ (B) $g^2 + f^2 - c^2 = 0$

(C) $g^2 + f^2 - c < 0$ (D) $g^2 + f^2 - c > 0$

64. The integral $\int \frac{\sec^2(\log x)}{x} dx$ has the value

(A) $\frac{\cot x}{x^2} + C$ (B) $\tan(\log x) + C$

(C) $\frac{\tan(\log x)}{x^2} + C$ (D) $\frac{\cos ec^2 x}{\log x} + C$

65. For any vector $\vec{a}$, the expression $(\vec{a}.\hat{i})\hat{i}+(\vec{a}.\hat{j})\hat{j}+(\vec{a}.\hat{k})\hat{k}$ is equal to

(A) $\vec{a}$ (B) $\hat{i}$

(C) $\hat{j}$ (D) $\hat{k}$

66. Two skew lines $\vec{r}=\vec{r}_1+\lambda\vec{u}$ and $\vec{r}=\vec{r}_2+\mu\vec{v}$ intersect if $\frac{(\vec{r}_2-\vec{r}_1).(\vec{u}\times\vec{v})}{|\vec{u}\times\vec{v}|}$ is equal to

(A) 0 (B) 1

(C) $-1$ (D) 2

67. If $|\vec{a}|=\sqrt{26}$, $|\vec{b}|=7$ and $|\vec{a}\times\vec{b}|=35$, then $\vec{a}.\vec{b}$ is equal to

(A) $-7$ (B) 7

(C) 5 (D) 9

68. $\lim\limits_{x\to 0}\left[\frac{\sin 3x+4x}{7x+\tan 2x}\right]$ is equal to

(A) $\frac{4}{7}$ (B) $\frac{7}{4}$

(C) $\frac{7}{9}$ (D) $\frac{9}{7}$

69. The integral $\int\limits_{\pi/8}^{3\pi/8}\frac{\cos x}{\cos x+\sin x}\,dx$ has the value

(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

70. Let A and B be two square matrices such that AB=A, BA=B, then $B^2$ is equal to

(A) A (B) I

(C) 0 (D) B

71. If $\sin\phi+\operatorname{cosec}\phi=2$, then $\sin^2\phi+\operatorname{cosec}^2\phi$ is equal to

(A) 1 (B) 2

(C) 4 (D) 0

72. Sum of the cubes of first n odd natural numbers is

(A) $\{n(2n-1)\}^2$ (B) $n^2(2n-1)$

(C) $n^2(2n^2+1)$ (D) $n^2(2n^2-1)$

73. The value of $\left(-\sqrt{-1}\right)$ is

(A) 0 (B) 1

(C) $i$ (D) $-i$

74. The value of the integral $\int \frac{x}{1+x^4}\,dx$ is

(A) $\frac{1}{2}\tan^{-1} x^2 + C$ (B) $\log\left(1+x^2\right)+C$

(C) $\sin^{-1} 2x + C$ (D) $\cot^{-1} x + C$

75. If $A$ and $B$ are events such that $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$, then $P(A \cap B)$ is

(A) 0.75 (B) 0.45

(C) 0.30 (D) 0.24

76. The value of $m$ for which the line $\vec{r} = (\hat{i} + 2\hat{j} - \hat{k}) + \lambda(2\hat{i} + \hat{j} + 2\hat{k})$ is parallel to the plane $\vec{r}.(3\hat{i} - 2\hat{j} + m\hat{k}) = 12$ is

(A) 2 (B) 1

(C) $-1$ (D) $-2$

77. A and B are two square matrices and their inverses exist, then $(AB)^{-1}$ is equal to

(A) $A^{-1}B^{-1}$ (B) $A^{-1}B$

(C) $B^{-1}A^{-1}$ (D) $BA^{-1}$

78. $\int_1^3 \frac{\cos(\log x)}{x}\,dx$ has the value

(A) $\sin(\log 3)$ (B) $\sin(\log 2) - 3$

(C) $\log 3$ (D) $2\log 2$

79. If $y = \tan^{-1}\frac{ax-b}{bx+a}$, then $\frac{dy}{dx}$ is equal to

(A) $\frac{a}{1+x^2}$ (B) $\frac{b}{1+x^2}$

(C) $\frac{1}{1+x^2}$ (D) $\frac{-1}{1+x^2}$

80. Rolle's theorem is not applicable to the function $f(x) = |x|$ for $-2 \leq x \leq 2$ because

(A) $f(x)$ is not continuous at $x = 0$ (B) $f(x)$ is not differentiable at $x = 0$

(C) $f(-2) = f(2)$ (D) None of these

81. The relation $R = \{(a, b) : a \text{ is a multiple of } b\}$ is a relation in N. Then R is

(A) Reflexive and symmetric but not transitive

(B) Reflexive and transitive but not symmetric

(C) Neither symmetric nor reflexive

(D) Equivalence relation

82. In a class of 125 students, 55 passed in Mathematics and 70 in Physics and 30 in both. The probability that a student selected at random from the class has passed only in one subject is

(A) 1 (B) $\frac{19}{25}$

(C) $\frac{8}{25}$ (D) $\frac{13}{25}$

83. Family $y = Ax + A^3$ of curve is represented by the differential equation of degree

(A) Three (B) Two

(C) One (D) None of these

84. The equation of the parabola with vertex at the origin and focus at $F(-2, 0)$ is

(A) $x^2 = -8y$ (B) $x^2 = 8y$

(C) $y^2 = -8x$ (D) $y^2 = 8x$

85. The co-efficient of $x^6$ in the expansion of $(1+x)^3 (1-x)^2$ is

(A) 1 (B) 2

(C) 3 (D) None of these

86. The value of $\sqrt{2+\sqrt{2+2\cos 4\phi}}$ is equal to

(A) $\sin\phi$ (B) $\cos\phi$

(C) $2\sin\phi$ (D) $2\cos\phi$

87. A and B are square matrices of order 3 such that $|A| = -1$ and $|B| = 3$, then $|3AB|$ is equal to

(A) $-9$ (B) $-27$

(C) 81 (D) $-81$

88. The volume of a ball is increasing at the rate of $4\pi$ c.c/sec. The rate of increase of radius when the volume is $288\pi$ c.c is

(A) $\frac{1}{6} cm/\sec$ (B) $\frac{1}{36} cm/\sec$

(C) $\frac{1}{9} cm/\sec$ (D) $\frac{1}{24} cm/\sec$

89 If $x = t^2$, $y = t^3$, then $\frac{d^2y}{dx^2}$ is equal to

(A) $\frac{3}{2}$ (B) $\frac{3}{2t}$

(C) $\frac{3}{4t^2}$ (D) $\frac{3}{4}$

90. $\lim_{x \to 0} \frac{3^{2+x} - 9}{x}$ is equal to

(A) $9 \log_e 3$ (B) $3 \log_e 9$

(C) 1 (D) $\log_e 3^2$

91. The number of diagonals that can be formed by a polygon of 100 sides is

(A) 4,850 (B) 4,950

(C) 5,000 (D) 10,000

92. If $\cos x + \cos y = \frac{1}{3}$ and $\sin x + \sin y = \frac{1}{4}$, then $\tan\left(\frac{x+y}{2}\right)$ is equal to

(A) $\frac{4}{3}$ (B) $\frac{3}{4}$

(C) $\frac{1}{4}$ (D) $\frac{1}{3}$

93. If $f(x) = \frac{x}{x-1}$, then $\frac{f(a)}{f(a+1)}$ is equal to

(A) $f(-a)$ (B) $f\left(\frac{1}{a}\right)$

(C) $f(a^2)$ (D) $f\left(-\frac{a}{a-1}\right)$

94. If $\sin A = \frac{1}{\sqrt{5}}$ and $\cos B = \frac{3}{\sqrt{10}}$, then the value of $A + B$ is

(A) $0°$ (B) $30°$

(C) $45°$ (D) $60°$

95. The point $(3, -2, -5)$ lies in octant

(A) I (B) III

(C) VI (D) VIII

96. The solution set of the equation $x^2 + \frac{x}{\sqrt{2}} + 1 = 0$ are

(A) $\left(\frac{1+\sqrt{7}i}{2\sqrt{2}}, \frac{1-\sqrt{7}i}{2\sqrt{2}}\right)$ (B) $\left(\frac{-1+\sqrt{7}i}{2\sqrt{2}}, \frac{-1-\sqrt{7}i}{2\sqrt{2}}\right)$

(C) $\left(\frac{1+\sqrt{7}i}{\sqrt{2}}, \frac{1-\sqrt{7}i}{\sqrt{2}}\right)$ (D) $\left(\frac{-1+\sqrt{7}i}{2}, \frac{-1-\sqrt{7}i}{2}\right)$

97. The equation $\frac{x^2}{10-a} + \frac{y^2}{4-a} = 1$ represents an ellipse if

(A) $a < 4$ (B) $a > 4$

(C) $4 < a < 10$ (D) $a > 10$

98. If $|\vec{a}| = 2$, $|\vec{b}| = 7$ and $\vec{a} \times \vec{b} = 3\hat{i} + 2\hat{j} + 6\hat{k}$, the angle between $\vec{a}$ and $\vec{b}$ is

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$

(C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$

99. Angle made by the vector $\vec{r} = \hat{i} + \hat{j} - \hat{k}$ with the X-axis is

(A) $\cos^{-1}\frac{1}{2}$ (B) $\cos^{-1}\frac{1}{3}$

(C) $\cos^{-1}\frac{1}{\sqrt{3}}$ (D) $\cos^{-1}\sqrt{3}$

100. Direction ratios of the line $\frac{4-x}{2} = \frac{y}{6} = \frac{1-z}{3}$ are

(A) $-2, 6, -3$ (B) $2, 6, 3$

(C) $\frac{1}{2}, 6, 3$ (D) $\frac{1}{2}, \frac{6}{4}, \frac{3}{4}$