Class 12 CBSE important questions for 2026 Exam
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1. A function $f: R \to R$ is defined by

$$f(x) = \begin{cases} e^{-2x}, & x < \ln\frac{1}{2} \\ 4, & \ln\frac{1}{2} \le x \le 0 \\ e^{-2x}, & x \ge 0 \end{cases}$$

Which if the following statement is true about the function at the point $x = \ln\frac{1}{2}$?

(a) $f(x)$ is not continuous but differentiable

(b) $f(x)$ is continuous but not differentiable

(c) $f(x)$ is neither continuous nor differentiable

(d) $f(x)$ is both continuous as well as differentiable

2. (a) Check of the relation R on the set $A = \{1, 2, 3, 4, 5, 6\}$ defined as $R = \{(x, y): y \text{ is divisible by } x\}$ is

(i) Symmetric (ii) Transitive

(b) Show that the function $f\ in\ A = \boldsymbol{R} - \left\{\frac{2}{3}\right\},\ defined\ as\ f(x) = \frac{4x+3}{6x-4}\ is\ one - one$

3. a. Show that the relation defined by $R_1 = \{(x, y): |x^2 = y^2\}\ x, y\ \in \boldsymbol{R}$ is an equivalence relation.

b. Show that the function $f: N \to N$, given by $f(x) = 2x$ is one-one but not onto.

4. Find the value of k for which the function f given as

$$f(x) = \begin{cases} \dfrac{1 - \cos x}{2x^2}, & if\ \ x \ne 0 \\ k\ \ , & if\ \ x = 0 \end{cases}$$

is continuous at $x = 0$

5. A function $f: [-3, 3] \to [0, 3]$ is given by $f(x) = \sqrt{9 - x^2}$. Shows that f is an onto function but non one-one function. Further find all possible values of 'a' for which $f(a) = \sqrt{5}$.

6. Evaluate

(a) $\tan^{-1}\left[2\sin\left(2\cos^{-1}\frac{\sqrt{3}}{2}\right)\right]$

(b) $\sin^{-1}(\cos\frac{33\pi}{5})$

7. Find the domain of $\sin^{-1}(x^2 - 4)$

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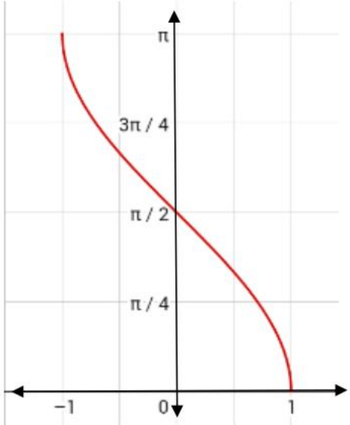
Solution to the test

8. The graph drawn below depicts



(a) $\sin^{-1} x$
(b) $\cos^{-1} x$
(c) $\text{cosec}^{-1} x$
(d) $\cot^{-1} x$

9. Using matrix method, solve the following system of linear equations

$$\frac{2}{x}+\frac{3}{y}+\frac{10}{z}=4$$
$$\frac{4}{x}-\frac{6}{y}+\frac{5}{z}=1$$
$$\frac{6}{x}+\frac{9}{y}-\frac{20}{z}=2$$

10. If $A=\begin{bmatrix}5 & 0 & x\\ 0 & 5 & 0\\ 0 & 0 & y\end{bmatrix}$ is a scalar matrix, the find the value of y^x

11. Find the value of the determinant $\begin{vmatrix}\cos 67^o & \sin 67^o\\ \sin 23^o & \cos 23^o\end{vmatrix}$

12. If $A=\begin{bmatrix}1 & \cot x\\ -\cot x & 1\end{bmatrix}$, show that $A'A^{-1}=\begin{bmatrix}-\cos 2x & -\sin 2x\\ \sin 2x & -\cos 2x\end{bmatrix}$

13. M is a matrix of order 3 such that $|adj\ V|=7$. Find the value of $|V|$.

14. If $f(a)=\begin{bmatrix}\cos a & -\sin a & 0\\ \sin a & \cos a & 0\\ 0 & 0 & 1\end{bmatrix}$, prove that $f(a).f(-\beta)=f(a-\beta)$

15. Find the derivative of 2^x w.r.t. 3^x.

16. If $x=\cot t$ and $y=\text{cosec}^2\, t$ find (i) $\frac{dy}{dx}$ (ii) $\frac{d^2y}{dx^2}$

17. If $y=\tan x+\sec x$, then prove that $\frac{d^2y}{dx^2}=\frac{\cos x}{(1-\sin x)^2}$

18. Find the interval in which the function f defined by $f(x)=e^x$ is strictly increasing.

19. Find the absolute maximum value of function $f(x)=x^3-3x+2$ in $[0,2]$.

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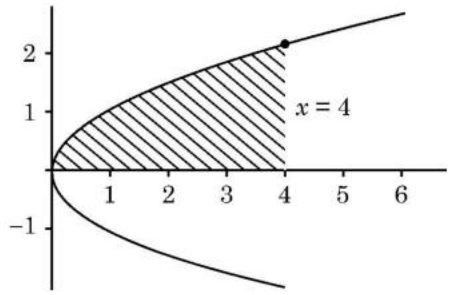
20. If the sides of a square are decreasing at the rate of 1.5 cm/s, find the rate of decrease of its perimeter.
21. Ramesh, the owner of a sweet selling shop, purchased some rectangular card board sheets of dimension 25 by 40 cm cm to make container packets without top. Let x cm be the length of the side of the square to be cut out from each corner to give that sheet the shape of the container by folding up the flaps. Based on the above information answer the following questions
    (i) Express the volume (V) of each container as function of x only.
    (ii) Find $\frac{dV}{dx}$
    (iii) For what value of x , the volume of each container is maximum?
    (iv) Check whether V has a point of inflection at x = 65/6 or not?
22. Find $\int \frac{x+\sin x}{1+\cos x}\, dx$
23. Find $\int \frac{x^2+1}{(x^2+2)(x^2+4)} dx$
24. Evaluate $\int_{\pi/6}^{\pi/3} \frac{dx}{1+\sqrt{\tan x}}$
25. Evaluate $\int_0^{2\pi} \operatorname{cosec}^7 x\ dx$
26. Find the area of the shaded region bounded by the curves $y^2 = x, x = 4$ and the x-axis.



27. Using integration find the area of the region $\{(x, y): x^2 - 4y \leq 0,\ y - x \leq 0\}$
28. Find the integrating factor of the differential equation $(1 - x^2)\frac{dy}{dx} + xy = ax, -1 < x < 1$
29. Find the degree of the differential equation $(y''')^2 + (y')^3 = x \sin(y')$
30. Find the general solution of the differential equations
    (a) $(x^2 + 1)\frac{dy}{dx} + 2xy = \sqrt{x^2 + 4}$
    (b) $(x^3 + y^3)dy = x^2 y\, dx$
31. If $\vec{a}, \vec{b}, \vec{c}$ are three non-zero unequal vectors such that $\vec{a}.\vec{b} = \vec{a}.\vec{c}$, then find the angle between $\vec{a}$ and $\vec{b} - \vec{c}$.
32. Let θ be the angle between unit vectors $\hat{a}$ and $\hat{b}$ such that $\sin\theta = \frac{3}{5}$. Then find the value of $\hat{a}.\hat{b}$.

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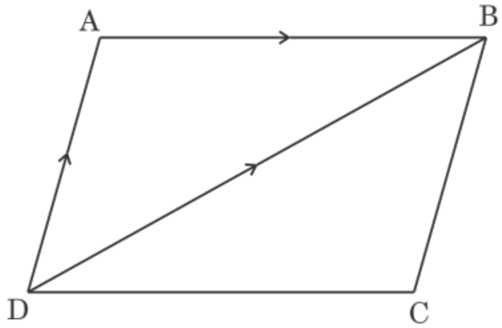
33. Find the image of the point $(1, 2, 1)$ with respect to the line $\frac{x-3}{1} = \frac{y+1}{2} = \frac{z-1}{3}$. Also find the equation of line joining the given point and its image

34. If the direction cosines of a line are $< \frac{1}{c}, \frac{1}{c}, \frac{1}{c} >$ then find the value of c.

35. In the given figure, ABCD is a parallelogram. If $\overrightarrow{AB} = 2\hat{\imath} - 4\hat{\jmath} + 5\hat{k}$ and $\overrightarrow{DB} = 3\hat{\imath} - 6\hat{\jmath} + 2\hat{k}$, the find $\overrightarrow{AD}$ and hence find the area of parallelogram ABCD.



36. Find the value of t, so that the lines $\frac{1-x}{3} = \frac{7y-14}{t} = \frac{z-3}{2}$ and $\frac{7-7x}{3t} = \frac{y-5}{1} = \frac{6-z}{5}$ are at right angles. Also, find whether the lines are intersecting or not.

37. If $\vec{a} = 4\hat{\imath} + 5\hat{\jmath} - \hat{k},\ \vec{b} = \hat{\imath} - 4\hat{\jmath} + 5\hat{k}$ and $\vec{c} = 3\hat{\imath} + \hat{\jmath} - \hat{k}$. Find a vector $\vec{d}$ which is perpendicular to both $\vec{c}$ and $\vec{b}$ and satisfying $\vec{d}.\vec{a} = 21$.

38. The random variable X has a probability distribution $P(X)$ of the following form, where 'k' is some real number

$$P(X) = \begin{cases} k, & if\ \ x = 0 \\ 2k, & if\ x = 1 \\ 3k, & if\ x = 2 \\ 0, & Otherwise \end{cases}$$

(i) determine the value of k

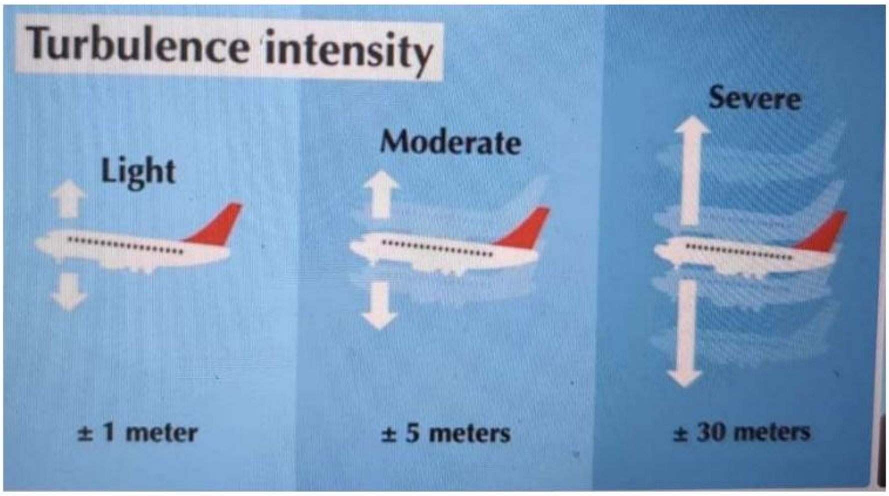
(ii) Find P(X < 2)

(iii) Find P(X > 2)

39. If E and F are two independent events such that $P(E) = \frac{2}{3}, P(F) = \frac{3}{7}$, then find $P\left(\frac{E}{\bar{F}}\right)$

40. According to recent research, air turbulence has increased in various regions around the world due to climate change. Turbulence makes flights bumpy and often delays the flights.

Assume that, an airplane observes severe turbulence, moderate turbulence or light turbulence with equal probabilities. Further, the chance of an airplane reaching late to the destination are 55%, 37% and 17% due to severe, moderate and light turbulence respectively.

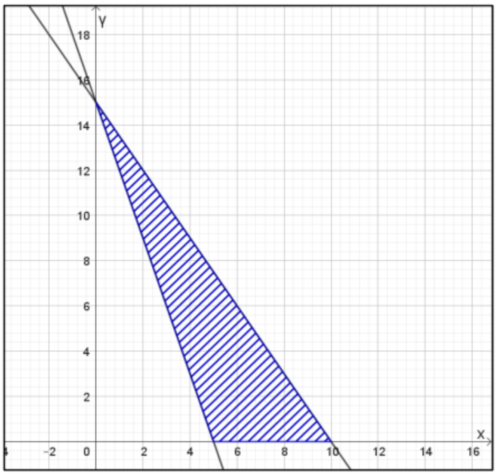


On the basis of the above information, answer the following questions:

(i) Find the probability that an airplane reached its destination late.

(ii) If the airplane reached its destination late, find the probability that it was due to moderate turbulence.

41. The feasible region of a linear programming problem is bounded but the objective function attains its minimum value at more than one point. One of the points is (5,0).



Then one of the other possible points at which the objective function attains its minimum value is

(a) (2,9)

(b) (6,6)

(c) (4,7)

(d) (0,0)

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Solution to the test

42. Solve the following linear programming problem Graphically

Minimize: $Z = 6x + 3y$

$$Subject\ to\ contraints = \begin{cases} 4x + y \geq 80, \\ x + 5y \geq 115 \\ 3x + 2y \leq 150 \\ x \geq 0, y \geq 0 \end{cases}$$

43. Solve the following linear programming problem Graphically

Maximize: $P = 70x + 40y$

$$Subject\ to\ contraints = \begin{cases} 3x + 2y \leq 9, \\ 3x + y \leq 9 \\ x \geq 0, y \geq 0 \end{cases}$$