Bihar Board Class 12 Mathematics Question Paper 2017

INTERMEDIATE EXAMINATION - 2017

(ANNUAL)

MATHEMATICS

Time- $3\frac{1}{4}$ **Hours**

Full Marks: 100

Instruction for the candidates:

1) Candidates are required to give their answers in their own words as far as practicable.
2) Figures in the right hand margin indicate full marks.
3) 15Minutes of extra time has been allotted for the candidates to read the questions carefully.
4) This question paper is divided into two **section A** and **section B.**
5) In **section-A,** there are **40 objective type questions** which are compulsory, each carry **1 mark.** Darken the circle with blue/black ball pen against the correct option on **OMR** answer Sheet provided to you. **Do not use whitener/Liquid/Blade/Nall etc. on OMR Sheet; otherwise the result will be invalid.**
6) In **Section-B,** there **are 25 short answer** type question (each carrying **2 marks**),out of which **any 15** questions are to be answered. Apart this, there are **8 Long Answer** Type question (Each Carrying **5 Marks**), Out of which **any 4** questions to be answered.
7) Use of any electronic appliances is strictly prohibited.

Section-l

For the following Q. No. 1 to 40 there is only correct answer against each question. Mark the correct option on the answer sheet. 40 x 1 = 40

1.If $A\{1,2,3\}$,then how many equivalence relation can be defined on A containing $(1,2)$

(a)2 (b)3

(c)8 (d)6

Sol:

Correct option is A.

2. If $n(A)=3$ and $n(B)=2$ then$\left(A\times B\right)=......$

(a) 6 (b)4

(c)2 (d)0

Sol:

Correct option is A.

3.If $f : R \to R$ such that $f(x) = 3x - 4$ then which of the following $f^{-1}(x)$?

(a) $\frac{x+4}{3}$ (b) $\frac{1}{3}x - 4$

(c) $3x - 4$ (d) $3x + 5$

Sol:

Correct option is A.

4. $\frac{d}{dx}(\tan ax) =$

(a) $\cos x$ (b) $-\sin x$

(c) $-\cos x$ (d) $\tan x$

Sol:

Correct option is A.

5. $\frac{d}{dx}(\tan ax) =$

(a) $a \tan ax$ (b) $a \sec^2 ax$

(c) $a \sec x$ (d) $a \cot ax$

Sol:

Correct option is B.

6. $\begin{vmatrix} 1 & 1 & 2 \\ 2 & 2 & 4 \\ 3 & 5 & 6 \end{vmatrix} = ...?$

(a)5 (b)7

(c)0 (d)9

Sol:

Correct option is C.

7. $\tan^{-1}(1) = ...?$

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{8}$

Sol:

Correct option is A.

8. $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{4} = ...$

(a) $\tan^{-1}\frac{3}{2}$ (b) $\tan^{-1}\frac{6}{7}$

(c) $\tan^{-1}\frac{5}{6}$ (d) $\tan^{-1}\frac{1}{2}$

Sol;

Correct option is B.

9. If $\begin{vmatrix} x & 5 \\ 5 & x \end{vmatrix} = 0$ then $x = 0$

(a) ± 5 (b)6

(c)0 (d)4

Sol:

Correct option is A.

10. $\begin{vmatrix} 10 & 2 \\ 35 & 7 \end{vmatrix} = ...$

(a)4 (b)0

(c)3 (d)6

Sol:

Correct option is B.

11. If $A=\begin{bmatrix} 9 & 10 & 11 \\ 12 & 13 & 14 \end{bmatrix}$ and $B=\begin{bmatrix} 11 & 10 & 9 \\ 8 & 7 & 6 \end{bmatrix}$ then $A+B=$..........

(a) $\begin{bmatrix} 20 & 20 & 20 \\ 20 & 20 & 20 \end{bmatrix}$ (b) $\begin{bmatrix} 10 & 10 & 10 \\ 10 & 10 & 10 \end{bmatrix}$

(c) $\begin{bmatrix} 10 & 5 & 10 \\ 5 & 10 & 10 \end{bmatrix}$ (d) $\begin{bmatrix} 25 & 10 & 15 \\ 15 & 10 & 25 \end{bmatrix}$

Sol:

Correct option is A.

12. $\frac{d}{dx}(\sec x)=$

(a) $\sec^2 x$ (b) $\tan^2 x$

(c) $\sec x \tan x$ (d) 0

Sol:

Correct option is C.

13. $\frac{d}{dx}(\sin^{-1} x)=$

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

(c) $\frac{1}{\sqrt{1-x^2}}$ (d) $\frac{1}{\sqrt{1+x^2}}$

Sol:

Correct option is C.

14. $\frac{d}{dx}(\sin^{-1} x+\cos^{-1} x)=$.........

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

(b)0

(c)2

(d)1

Sol:

Correct option is A.

15. If $y=\sin(\log x)$,then $\frac{dy}{dx}=$...........

(a) $\frac{1}{x}\cos(\log x)$

(b) $\frac{1}{x}\sin(\log x)$

(c) 0

(d) 1

Sol:

Correct option is A.

16.If $y=x^5$ then $\frac{dy}{dx}=$...........

(a) $5x$

(b) $6x$

(c) $5x^4$

(d) $5x^2$

Sol:

Correct option is C.

17. $\int x^5 dx=$...........

(a) $\frac{x^6}{6}+k$

(b) $\frac{x^5}{5}+k$

(c) $\frac{x^7}{7}+k$

(d) $\frac{x^8}{8}+k$

Sol:

Correct option is A.

18. $\int 0.dx=$...........

(a)k

(b)0

(c)1

(d)-1

Sol:

Correct option is B.

19. $\int \frac{dx}{x} = ...$

(a) $x + k$

(b) $\frac{1}{x^2} + k$

(c) $-\frac{1}{x^2} + k$

(d) $\log x + k$

Sol:

Correct option is D.

20. $\int_b^a x^3 dx = ...$

(a) $\frac{b^3 - a^3}{3}$

(b) $\frac{b^4 - a^4}{4}$

(c) $\frac{b^2 - a^2}{2}$

(d) 0

Sol:

Correct option is B.

21.The solution of $\frac{dy}{dx} = \frac{x}{y}$ is-

(a) $\frac{y^2}{2} - \frac{x^2}{2} = k$

(b) $\frac{x^2}{2} + \frac{y^2}{2} = k$

(c) $\frac{x - y}{2} = k$

(d) $\frac{x + y}{5} = k$

Sol:

Correct option is A.

22.The solution of the differential equation $\frac{dy}{dx} = e^{x-y}$ is

(a) $e^{x} + e^{-y} + k = 0$

(b) $e^{2x} = ke^{y}$

(c) $e^{x} - e^{y} = k$

(d) $e^{x+y} = k$

Sol:

Correct option is C.

23.The order of the differential equation $\frac{dy}{dx} + 4y = 2x$ is-

(a)0

(b)1

(c)2

(d)3

Sol:

Correct option is B.

24. The degree of the equation $\left(\frac{d_2 y}{dx^2}\right)^3 - 4\frac{dy}{dx} = 2$ is

(a)0

(b)1

(c)2

(d)3

Sol:

Correct option is D.

25.The position vector of the point $(4,5,6)$ is

(a) $4\vec{i} + 5\vec{j} + 6\vec{k}$

(b) $4\vec{i} - 5\vec{j} - 6\vec{k}$

(c) $2\vec{i} + \vec{j} + \vec{k}$

(d) $\vec{i} + \vec{j} + \vec{k}$

Sol:

Correct option is A.

26. $\left|2\vec{i} - 3\vec{j} + \vec{k}\right| =$

(a)14

(b) $\sqrt{14}$

(c) $\sqrt{3}$ (d)2

Sol:

Correct option is A.

27.If $\overrightarrow{OA} = 2\vec{i} + 5\vec{j} - 2\vec{k}$ and $\overrightarrow{OB} = 3\vec{i} + 6\vec{j} + 5\vec{k}$ then $\overrightarrow{AB} =$

(a) $\vec{i} + \vec{j} + 7\vec{k}$ (b) $5\vec{i} + 2\vec{j} + 7\vec{k}$

(c) $2\vec{i} + \vec{j} + \vec{k}$ (d) $\vec{i} + \vec{j} + 7\vec{k}$

Sol:

Correct option is A.

28.If $\vec{a} = \vec{i} + \vec{j} + 3\vec{k}; \vec{b} = 2\vec{i} + 3\vec{j} - 5\vec{k}$ then $\vec{a}.\vec{b} =$

(a)10 (b)-10

(c)20 (d)5

Sol:

Correct option is B.

29.If $\vec{a}$ and $\vec{b}$ are mutually perpendicular then $3\vec{j}$

(a)1 (b)0

(c)2 (d)3

Sol:

Correct option is B.

30. $\vec{j} \times \vec{k} =$

(a) $\vec{i}$ (b) $-\vec{i}$

(c) $\vec{0}$ (d)1

Sol:

Correct option is A.

31. The direction cosines of z-axis are-

(a) $(0,0,0)$ (b) $(1,0,0)$

(c) $(0,0,1)$ (d) $(0,1,0)$

Sol:

Correct option is C.

32. $\vec{k} \times \vec{k} =$

(a)1 (b) 0

(c)2 (d)-1

Sol:

Correct option is A.

33. Let l_1, m_1, n_1 and l_2, m_2, n_2 be the direction cosines of two st-lines both the lines are perpendicular to each other, if-

(a) $l_1l_2 + m_1m_2 + n_1n_2$ (b) $l_1l_2 + m_1m_2 + n_1n_2 = 1$

(c) $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$ (d) $\frac{l_1}{l_2} + \frac{m_1}{m_2} + \frac{n_1}{n_2} = 0$

Sol:

Correct option is A.

34.let a,b,c be the direction ratios of a line then direction cosines are

(a) $\frac{a}{\sqrt{\sum a^2}}, \frac{b}{\sqrt{\sum a^2}}, \frac{c}{\sqrt{\sum a^2}}$ (b) $\frac{1}{\sqrt{\sum a^2}}, \frac{1}{\sqrt{\sum a^2}}, \frac{1}{\sqrt{\sum a^2}}$

(c) $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ (d) $\frac{a}{\sqrt{\sum a^2}}, \frac{b}{\sqrt{\sum b^2}}, \frac{c}{\sqrt{\sum c^2}}$

Sol:

Correct option is D.

35. A line is passing through (α, β, γ) and its direction cosines are l, m, n then the equations of the line are-

(a) $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$

(b) $\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$

(c) $\frac{x+\alpha}{l} = \frac{y+\beta}{m} = \frac{z+\gamma}{n}$

(d) $\frac{x-\alpha}{l} = \frac{y+\beta}{m} = \frac{z-\gamma}{n}$

Sol:

Correct option is D.

36.The direction ratio of the normal to the plane $7x+4y-2z+5=0$ are

(a) $7,4,-2$

(b) $7,4,5$

(c) $7,4,2$

(d) $4,-2,5$

Sol:

Correct option is A.

37. If A and B are two independent event then $P(A \cap B) =$

(a) $P(A).P(B)$

(b) $P\left(\frac{A}{B}\right)$

(c) $P(A)+P(B)$

(d) $P(A)+P(B)-P(A \cap B)$

Sol:

Correct option is A.

38.If S be the sample space and E be the event then $P(E) =$ ....

(a) $\frac{n(E)}{n(S)}$

(b) $\frac{n(S)}{n(E)}$

(c) $n(E)$

(d) $n(S)$

Sol:

Correct option is A.

39.If A,B and C are three event independent of each other then $P(A \cap B \cap C) =$

(a) $P(A)+P(B)+P(C)$ (b) $P(A)-P(B)+P(C)$

(c) $P(A)+P(B)-P(A\cap B)$ (d) $P(A)P(B)P(C)$

Sol:

Correct option is D.

40.If $P(A)=\frac{3}{8}:P(B)=\frac{1}{2}$ and $P(A\cap B)=\frac{1}{4}$ then $P(A\cup B)=$...........

(a) 0 (b) $\frac{5}{8}$

(c) 1 (d) 4

Sol:

Correct option is B.

Section-ll:(Non-Objective Type)

Question Nos. 1 to 8 are of short answer type. Each question carries 4 marks.

1. If $f:R\to R$ be a function defined by $f(x)=x^2$ show that the function f is many one into.

Sol:

Given that $f:R\to R$ is defined as $f(x)=x^2$

Then $x\in R\Rightarrow f(x)=x^2$

Again, $-x\in R\Rightarrow f(-x)=(-x)^2=x^2$

i.e $x\neq -x\Rightarrow f(x)=f(-x)$

So, by the definition of many one function, the given function is many one.

Further, for x or $-x\in R, x^2$ is always positive and $x^2\in R$ (secondly)unique.

Now, x^2 is not negative because of those real number which is negative and $\in R$ (secondly) has not any image of $\in R$ (firstly) so, f is into.

Thus, the function $f:R\to R$ defined as $f(x)=x^2$ is many on the into.

2. If $A=\begin{bmatrix}2 & 5\\ 3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 5\\ 6 & 2\end{bmatrix}$ then find $(A+B)$ and $(A-B)$

Sol:

Given $A=\begin{bmatrix}2 & 5\\ 3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 5\\ 6 & 2\end{bmatrix}$

$$\therefore A+B=\begin{bmatrix}2 & 5\\ 3 & 1\end{bmatrix}+\begin{bmatrix}1 & 5\\ 6 & 2\end{bmatrix}$$
$$=\begin{bmatrix}2+1 & 5+5\\ 3+6 & 1+2\end{bmatrix}=\begin{bmatrix}3 & 10\\ 9 & 3\end{bmatrix}$$

And,

$$A-B=\begin{bmatrix}2 & 5\\ 3 & 1\end{bmatrix}-\begin{bmatrix}1 & 5\\ 6 & 2\end{bmatrix}$$
$$=\begin{bmatrix}2-1 & 5-5\\ 3-6 & 1-2\end{bmatrix}=\begin{bmatrix}1 & 0\\ -3 & -1\end{bmatrix}$$

3. Prove that $\tan^{-1}x+\cot^{-1}x=\frac{\pi}{2}$

Sol:

Let $\tan^{-1}x=y$ Then $x=\tan y$

$$\Rightarrow x=\cot\left(\frac{\pi}{2}-y\right)$$

$$\Rightarrow \cot^{-1}x=\frac{\pi}{2}-y$$

$$\Rightarrow y+\cot^{-1}x=\frac{\pi}{2}$$

$$\Rightarrow \tan^{-1}x+\cot^{-1}x=\frac{\pi}{2}$$

4. If $y=\tan(\sin^{-1}x)$ then find $\frac{dy}{dx}$

Sol:

Given $y=\tan(\sin^{-1}x)$

$$\therefore \frac{dy}{dx} = \frac{d}{dx}\left\{\tan(\sin^{-1} x)\right\} \times \frac{d}{dx}(\sin^{-1} x)$$

$$\Rightarrow \frac{dy}{dx} = \sec^2(\sin^{-1} x) \times \frac{1}{\sqrt{1-x^2}} = \frac{\sec^2(\sin^{-1} x)}{\sqrt{1-x^2}}$$

5. If $y = \sin\left[\cos\left\{\tan(\cot x)\right\}\right]$ then find $\frac{dy}{dx}$

Sol:

Simplify the expression,

Let $y = \tan^{-1} x \Rightarrow x = \tan y$

If δx be a small change in x and δy be the corresponding change in y,

$x + \delta x = \tan\left(y + \delta y\right)$

Subtracting (1) from (2), we get

$x + \delta x - x = \tan\left(y + \delta y\right) - \tan y$

$$\delta x = \tan\left(y + \delta y\right) - \tan y = \frac{\sin\left(y + \delta y\right)}{\cos\left(y + \delta y\right)} - \frac{\sin y}{\cos y}$$

$$\delta x = \frac{\sin\left(y + \delta y - y\right)}{\cos y \cos\left(y + \delta y\right)} = \frac{\sin \delta y}{\cos y \cos\left(y + \delta y\right)}$$

$$\frac{\delta x}{\delta y} = \frac{\sin \delta y}{\delta y} \cdot \frac{1}{\cos y \cos\left(y + \delta y\right)}$$

$$\frac{\delta y}{\delta x} = \frac{\delta y}{\sin \delta y} \cdot \cos y \cos\left(y + \delta y\right)$$

Taking limit on the both sides, we get

$$\lim_{\delta x \to 0} \frac{\delta y}{\delta x} = \lim_{\delta y \to 0} \frac{\delta y}{\sin \delta y} \lim_{\delta y \to 0} \cos y \cos\left(y + \delta y\right)$$

$$\frac{dy}{dx} = 1.\cos y.\cos y = \cos^2 y = \frac{1}{sec^2 y}$$

$$\frac{dy}{dx} = \frac{1}{sec^2 y} = \frac{1}{1 + \tan^2 y} = \frac{1}{1 + x^2}$$

Hence, the value is $y = \tan^{-1} x$ then $\frac{dy}{dx} = \frac{1}{1 + x^2}$.

6. Integrate $\int \sin^2 x.\cos^2 x dx$

Sol:

Let,

$$\int \sin^2 x.\cos^2 xdx = \int \frac{1-\cos 2x}{2}.\frac{1+\cos 2x}{2}dx$$
$$= \frac{1}{4}\int (1-\cos^2 2x)dx = \frac{1}{4}\int \sin^2 2xdx$$
$$= \frac{1}{4}\int \frac{1-\cos 4x}{2}dx = \frac{1}{8}\left[x - \frac{\sin 4x}{4}\right] + C$$

7. Evaluate $\int_0^a \frac{xdx}{\sqrt{a^2-x^2}}$

Sol:

Let,

$$z^2 = a^2 - x^2$$

Then,

$$2zdz = -2xdz$$
$$\Rightarrow zdx = -2xdx$$

Also, when $x = 0$ then $z = a$ and $x = a$ then $z = 0$

Now,

$$I = \int_0^a \frac{xdx}{\sqrt{a^2-x^2}} = \int_a^0 \frac{-zdz}{z^2} = -\int_a^0 dz$$
$$\therefore I = \int_0^a \frac{xdx}{\sqrt{a^2-x^2}} - [z]_a^0 = -[0-a] = a$$

8. If $\vec{a} = \vec{i} - 2\vec{j} - 3\vec{k}; \vec{b} = 2\vec{i} + \vec{j} - \vec{k}$ and $\vec{c} = \vec{i} + 3\vec{j} - 2\vec{k}$ then find $\vec{a} \times (\vec{b} \times \vec{c})$.

Sol:

Given $\vec{a} = \vec{i} - 2\vec{j} - 3\vec{k}, \vec{b} = 2\vec{i} + \vec{j} - \vec{k}, \vec{c} = \vec{i} + 3\vec{j} - 2\vec{k}$

Then,

$$\vec{a} \times (\vec{b} \times \vec{c}) = ?$$

First of all

$$\vec{b}\times\vec{c}=\begin{vmatrix}\vec{i} & \vec{j} & \vec{k}\\ 2 & 1 & -1\\ 1 & 3 & -2\end{vmatrix}$$

$$\Rightarrow \vec{b}\times\vec{c}=(-2+3)\vec{i}-(-4+1)\vec{j}+(6-1)\vec{k}$$

$$\Rightarrow \vec{b}\times\vec{c}=-\vec{i}+3\vec{j}+5\vec{k}$$

Again

$$\vec{a}\times\left(\vec{b}\times\vec{c}\right)=\begin{vmatrix}\vec{i} & \vec{j} & \vec{k}\\ -1 & 3 & 5\\ 1 & -2 & -3\end{vmatrix}$$

$$\Rightarrow \vec{a}\times\left(\vec{b}\times\vec{c}\right)=(-9+10)\vec{i}-(3-5)\vec{j}+(2-3)\vec{k}$$

$$\Rightarrow \vec{a}\times\left(\vec{b}\times\vec{c}\right)=\vec{i}+2\vec{j}-\vec{k}$$

Question Nos. 9 to 12 are long answer type. Each question carries 7 marks. $[4\times 7]$

Long Answer Type Questions

9. If $y=x^{x^{x^{\ldots\ldots to\ \infty}}}$ then prove that $\dfrac{dy}{dx}=\dfrac{y^2}{x\left(1-y\log x\right)}$.

Sol.

Prove the expression,

We have $y=x^{x^{x^{\ldots\ldots to\ \infty}}}$

Taking logarithm on the both side and let $y=x^{x^{x^{\ldots\ldots to\ \infty}}}$ **=** $y=x^{x^{x^{\ldots\ldots to\ \infty}}}$ **=**y

Then $\log y=\log x^{y}\Rightarrow \log y=y\log x.$

Differentiating both sides w.r.t. x, we get

$$\frac{1}{y}\frac{dy}{dx}=y.\frac{1}{x}+\log x\frac{dy}{dx}\Rightarrow\left(\frac{1}{y}-\log x\right)\frac{dy}{dx}=\frac{y}{x}$$

$$\Rightarrow\left(\frac{1-y\log x}{y}\right)\frac{dy}{dx}=\frac{y}{x}\Rightarrow\frac{dy}{dx}=\frac{y.y}{x\left(1-y\log x\right)}$$

$$\Rightarrow\frac{dy}{dx}=\frac{y^2}{x\left(1-y\log x\right)}$$

Hence, the value of $\frac{dy}{dx}=\frac{y^2}{x\left(1-y\log x\right)}$.

10. Solve $\frac{dy}{dx}-\frac{xy}{1-x^2}=\frac{1}{1-x^2}$

Sol.

Simplify the expression,

Which is linear differential equation in the form of $\frac{dy}{dx}+Py=Q$

where P= $-\frac{x}{1-x^2}$ and $Q=\frac{1}{1-x^2}$

Integrating Factor $e^{-\int\frac{x}{1-x^2}dx}$

Let $1-x^2=z\Rightarrow-2xdx=dz\Rightarrow-xdx=dz$

Then I.F.= $e^{\int\frac{dz}{z}}=e^{\log z}=z=1-x^2$

$$\therefore y\times I.F=\int Q\times I.Fdx+C$$

$$\Rightarrow\frac{y}{1-x^2}=\int\frac{1}{1-x^2}.\left(1-x^2\right)dx+C$$

$$\Rightarrow\frac{y}{1-x^2}=\int dx+c=x+c\Rightarrow y=\left(1-x^2\right)\left(x+c\right)$$

$$\Rightarrow y=\left(1-x^2\right)\left(x+c\right)$$

Hence, this is the solution of given differential equation.

11. Find the question of the line intersecting the lines $\frac{x-a}{1}=\frac{y}{1}=\frac{z-a}{1}$ and $\frac{x+a}{1}=\frac{y}{1}=\frac{z+a}{1}$ are parallel to the line $\frac{x-a}{1}=\frac{y}{1}=\frac{z-a}{1}$.

Sol.

Simplify the expression,

We have the lines $\frac{x-a}{1}=\frac{y}{1}=\frac{z-a}{1}$ and $\frac{x+a}{1}=\frac{y}{1}=\frac{z+a}{1}$

Since the given lines intersect at P; therefore

Let $\frac{x-a}{1}=\frac{y}{1}=\frac{z-a}{1}=\lambda$ and $\frac{x+a}{1}=\frac{y}{1}=\frac{z+a}{1}=\mu$

$x=\lambda+a, y=\lambda, z=\lambda+a$ and $x=\mu-a, y=\mu, z=2\mu-a$

Now, $\lambda+a=\mu-a=\lambda-\mu=-2a$..........(1)

$\lambda=\mu$......(2)

Then the co-ordinates of P is (3a, 2a, 3a)

Lastly, the given lines, parallel to the line $\frac{x-a}{2}=\frac{y}{2}=\frac{z-a}{3}$ Then equation is parallel line is

$$\frac{x-a-3a}{2}=\frac{y-a-2a}{1}=\frac{z-3a-2a}{3}$$

$$\Rightarrow \frac{x-4a}{2}=\frac{y-3a}{1}=\frac{z-5a}{3}$$

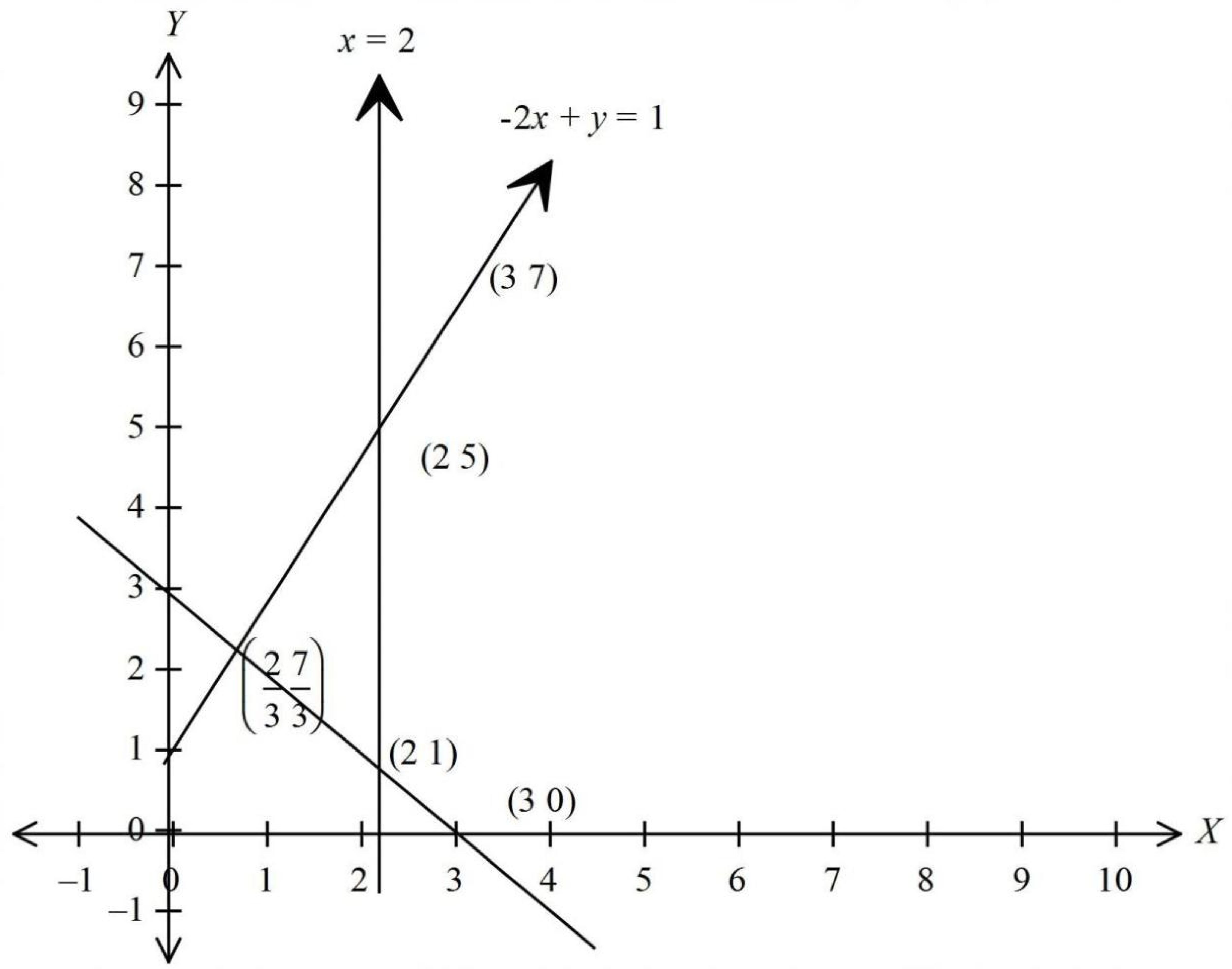
Hence, which is required parallel line.

OR.

Maximize $z=y-2x$

Subject to $x\le 2$, $x+y\le 3$, $-2x+y\le 1$, $x, y\ge 0$

Sol.



Simplify the expression,

Maximize. $z = y - 2x$

Subject to constraints

$x \le 2 \Rightarrow x = 2$
$x + y \le 3 \Rightarrow x + y = 3$
$-2x + y \le 1 \Rightarrow -2x + y = 1$

and $x, y \ge 0 \Rightarrow x, y = 0$

First of all draw graph of linear equation (1) to (4) corresponds to linear in equations. We get a feasilble

Region ABC ; which is bounded. Now the co-ordiantes of the points. A ,B, and C of feasible region ABC by solving equation (1), (2) and (3).(1) and (2) corresponds to in equation respectively C(2,3). Lastly by using corner point method for obtaining the maximize value of objective function Z are as follows:

Corner point	$z=y-2x$
$A(2/3,7/3)$	$z=\frac{7}{3}-\frac{14}{3}=-\frac{7}{3}$
$B(2,5)$	$z=5-2,2=1$
$C(2,1)$	$z=1-4=-3$

From above table that the maximum value of Z is one the point B. The maximum value of Z is one.

12. A speak the truth in 75% cases and dB B in 80% of the cases. In what percentage of the cases are they likely to contradict each other in stating the same fact?

Sol.

Simplify the expression,

Contradict in statement if. One speak truth and other speak lie

Then $n(E_1)=75$

$$P(E_1)=\frac{n(E_1)}{n(S)}=\frac{75}{100}=\frac{3}{4}$$

Again $E_2=B$ Speak lie then $n(E_2)=100-80=20$

$$P(E_2)=\frac{n(E_2)}{n(S)}=\frac{20}{100}=\frac{1}{5}$$

Thus the probability of a speak truth and B speak lie

$$P(E_1\cap E_2)=P(E_1)P(E_2)=\frac{3}{4}\times\frac{1}{5}=\frac{3}{20}........(1)$$

Again the probability of B speak truth and B speak truth and A speak lie is

$$P\left(E'_1 \cap E'_2\right) = P\left(E'_1\right) - P\left(E'_2\right)$$

$$P\left(E'_1\right) = 1 - P\left(E_1\right) = 1 - \frac{3}{4} = \frac{1}{4}$$

$$P\left(E'_2\right) = 1 - P\left(E_2\right) = 1 - \frac{1}{5} = \frac{4}{5}$$

$$\Rightarrow P\left(E'_1 \cap E'_2\right) = P\left(E'_1\right) P\left(E'_2\right) = \frac{1}{4} \times \frac{4}{5} = \frac{1}{5} \text{........(2)}$$

Then from (1) and (2)

The probability of contradict

$$= P\left(E_1 \cap E_2\right) \cup P\left(E'_1 \cap E'_2\right)$$

$$= P\left(E_1 \cap E_2\right) + P\left(E'_1 \cap E'_2\right)$$

$$= \frac{3}{20} + \frac{1}{5} = \frac{3+4}{20} = \frac{7}{20} = \frac{35}{100} = 35\%$$

Hence, percentage of contradicts is 35%