بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

বিস্‌মিল্লাহির রাহ্‌মানির রাহীম

Creative-Q

S1

S.2

Board Q

J.B-17

C.B-19

উদ্ভাস

একাডেমিক এন্ড এডমিশন কেয়ার

Previous Homework

Q:13- $\frac{1}{1-x+x^2}$, $\frac{1}{1+x+x^2}$, $\frac{2x}{1+x^2+x^4}$ and $\frac{(x+1)^2-(x^2+x)}{x^3+1}$ four algebraic expressions here ..

(A) Express The 1st and 2nd expressions in the form of common denominator → S.1 2

(B) 3rd expression+2nd expression-1st expression=0 show that → S.1 4

(C) What is the simplifying form of (2nd expression ÷ 3rd expression ÷ 4th expression) 4

↳ S.2

S.1 + S.2 → creative Q

Solution :

(A) Here , the 1st expression $= \frac{1}{1-x+x^2}$

and the 2nd expression $= \frac{1}{1+x+x^2}$

∴ L.C.M. of the denominator of the 1st and the 2nd denominator $= (1+x+x^2)(1-x+x^2)$

$$\therefore \frac{1}{1-x+x^2} = \frac{1+x+x^2}{(1-x+x^2)(1+x+x^2)} = \frac{1+x+x^2}{1+x^2+x^4}$$

∴ The 1st and the 2nd expressions in the form of common denominator: $\frac{1+x+x^2}{1+x^2+x^4}, \frac{1-x+x^2}{1+x^2+x^4}$

Previous Homework

(B) Here, the denominator of 3rd fraction $= 1 + x^2 + x^4$

$= 1^2 + 2x^2 + (x^2)^2 - x^2$

$= (1 + x^2)^2 - x^2$

$= (1 + x^2 + x)(1 + x^2 - x)$

$= (1 + x + x^2)(1 - x + x^2)$

L.H.S. = 3rd expression+2nd expression-1st expression

$= \frac{2x}{1+x^2+x^4} + \frac{1}{1+x+x^2} - \frac{1}{1-x+x^2}$

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

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

$= \frac{2x-2x}{1+x^2+x^4} = \frac{0}{1+x^2+x^4} = 0 = \text{R. H. S.}$

So, 3rd expression+2nd expression-1st expression =0 (Showed)

Previous Homework

(C) Here, 2nd expression= $\frac{1}{1+x+x^2}$

3rd expression $= \frac{2x}{(1+x^2+x^4)} = \frac{2x}{(1+x+x^2)(1-x+x^2)}$

4th expression $= \frac{(x+1)^2-(x^2+x)}{x^3+1} = \frac{x^2+2x+1-x^2-x}{(x+1)(x^2-x+1)} = \frac{x+1}{(x+1)(x^2-x+1)} = \frac{1}{x^2-x+1}$

Here, 2nd expression ÷ 3rd expression ÷ 4th expression

$$= \frac{1}{1+x+x^2} \div \frac{2x}{(1+x+x^2)(1-x+x^2)} \div \frac{1}{x^2-x+1}$$

$$= \frac{1}{(1+x+x^2)} \times \frac{(1+x+x^2)(1-x+x^2)}{2x} \times \frac{(x^2-x+1)}{1} = \frac{(1-x+x^2)^2}{2x}$$

Previous Homework

Q.5 I $M = p^2 - pq + q^2, N = p^2 + pq + q^2, R = p^4 + p^2q^2 + q^4$ and $S = p^6 - q^6$

[Ctg. B.2019]

A. What is the lowest form of $\frac{a^2+4a-21}{a^2+5a-14}$? → 51 — 2

B. $\frac{1}{M} - \frac{1}{N} - \frac{2pq}{R} = ?$ — 4

C. $\left(\frac{1}{N} - \frac{1}{M}\right) + \frac{p^2q^2}{S} = ?$ — 4

Solution:

(A) Given expression $= \frac{a^2+4a-21}{a^2+5a-14} = \frac{a^2+7a-3a-21}{a^2+7a-2a-14} = \frac{a(a+7)-3(a+7)}{a(a+7)-2(a+7)} = \frac{\cancel{(a+7)}(a-3)}{\cancel{(a+7)}(a-2)} = \frac{a-3}{a-2}$

The value of the lowest form is $\frac{a-3}{a-2}$

Previous Homework

(B) Here, $M = p^2 - pq + q^2$, $N = p^2 + pq + q^2$, $R = P^4 + p^2q + q^4$

$$\therefore \frac{1}{M} = \frac{1}{p^2-pq+q^2}$$

$$\frac{1}{N} = \frac{1}{p^2+pq+q^2}$$

$$\frac{2pq}{R} = \frac{2pq}{p^4+p^4q^2+q^4}$$

Here, $R = p^4 + p^2q^2 + q^4 = (p^2) + 2p^2q^2 + (q^2)^2 - p^2q^2$

$= (p^2 + q^2)^2 - (pq)^2 = (p^2 + q^2 + pq)(p^2 + q^2 - pq)$

Given expression $= \frac{1}{M} - \frac{1}{N} - \frac{2pq}{R} = \frac{1}{p^2-pq+q^2} - \frac{1}{p^2+pq+q^2} - \frac{2pq}{(p^2+p^2+pq)(p^2+q^2-pq)}$

$= \frac{p^2+pq+q^2-p^2+pq-q^2-2pq}{(p^2-pq+q^2)(p^2-pq+q^2)} = \frac{0}{(p^2+pq+q^2)(p^2-pq+q^2)} = 0$ (Ans)

Previous Homework

(C) Given, $M = p^2 - pq + q^2, N = p^2 + pq + q^2, S = P^6 - q^6$

Here, $S = P^6 - q^6$

$= (p^2)^3 - (q^2)^3 = (p^2 - q^2)(p^4 + p^2q^2 + q^4)$

$= (p + q)(p - q)(p^2 + pq + q^2)(p^2 - pq + q^2)$

Given expression $= \left(\frac{1}{M} - \frac{1}{N}\right) - \frac{p^2q^2}{S} = \left(\frac{1}{p^2+pq+q^2} - \frac{1}{p^2-pq+q^2}\right) + \frac{p^2q^2}{p^6-q^6}$

$$= \frac{p^2-pq+q^2-p^2-pq-q^2}{(p^2+pq+q^2)(p^2-pq+q^2)} \div \frac{p^2q^2}{(p+q)(p-q)(p^2+pq+q^2)(p^2-pq+q^2)}$$

$$= \frac{-pq}{(p^2+pq+q^2)(p^2-pq+q^2)} \times \frac{(p+q)(p-q)(p^2+pq+q^2)(p^2-pq+q^2)}{p^2q^2} = \frac{-2(p+q)(p-q)}{pq} = \frac{-2(p^2-q^2)}{pq}$$

$\therefore$ *The value is* $\frac{-2(p^2-q^2)}{pq}$

Previous Homework

POLL - 1

$$\frac{2p^2q^3}{3r} \times \frac{6r^2}{4p^2q^2} = ?$$ [Sylhet. Board: 14]

(a) pq (b) qr

(c) pr (d) pqr

Mult

Div

Sim

Poll - 1

$$\frac{\cancel{2}\cancel{p^2}\cancel{q^3}\,\cancel{6}\cancel{r^2}}{\cancel{3}\cancel{r}\,\cancel{4}\cancel{p^2}\cancel{q^2}}$$

$= qr$

Div

Previous Homework

POLL - 2

$$\frac{3x^2}{2a} \div \frac{4y^2}{15zx} = ?$$

[J. B: 16]

(a) $\frac{45zx^3}{8ay}$

(b) $\frac{45zx^2}{8ay}$

(c) $\frac{45zx^3}{8ay^2}$

(d) $\frac{45z^2x^2}{8ay^2}$

$$\frac{3x^2}{2a} \div \frac{4y^2}{15zx}$$

$$\downarrow$$

$$\frac{3x^2}{2x} \times \frac{15zx}{4y^2}$$

$$= \frac{45zx^3}{8ay^2}$$

Mul

Div

Simplify

Previous Homework

POLL - 3

$y^2, y \to$ LCM y^2

$\left(\frac{x}{y}+\frac{y}{x}-1\right) \div \left(\frac{x^2}{y^2}-\frac{x}{y}+1\right)$ What is the simplifying form of these fractions? [S. B: 18]

(a) $\frac{x}{y}$

(b) $\frac{y}{x}$

(c) $\frac{y^2}{x}$

(d) $\frac{2}{x}$

$\left(\frac{x}{y}+\frac{y}{x}-\frac{1}{1}\right) \div \left(\frac{x^2}{y^2}-\frac{x}{y}+1\right)$

$\left(\frac{x^2+y^2-xy}{yx}\right) \div \left(\frac{x^2-xy+y^2}{y^2}\right)$

$\frac{x^2+y^2-xy}{\cancel{y}x} \times \frac{y^{\cancel{2}}}{x^2+y^2-xy}$

$\frac{y}{x}$

আসসালামু আলাইকুম

Chapter- 6.1

Simple Simultaneous Equation

TAHSIN ANJUM

একাডেমিক এন্ড এডমিশন কেয়ার

What will we learn from 6.1?

Simple Simultaneous equation

Substitution Method

Elimination Method

Simple simultaneous equation

L.H.S R.H.S constant

X+Y=5 is an equation . Here x and y are two unknown expressions and variables . The variable are of single power . This is an example of simple equation . Here,the pair of numbers whose sum is equal to 5, will satisfy the equation.

L.H.S = R.H.S

For example , the equation will be satisfied by an infinite number of such pairs of number x=4,y=1 ;or x=3,y=2 ;or x=2,y=3 ; or x=1,y=4 .

eqn

$3x^2 + 5x + 10 = 0$

2

variables | Constant

$x^3 \to x$ power 3

$x^{10} \to$

10

$x^1 \to$ power

$2.49 + 2.51 = 5$

$x + y$

Simple simultaneous equation

Here, if we consider the equations x+y=5 and x-y=3, both equations are simultaneously satisfied by x=4 and y=1 . If two or more equations connected by the same set of variables , the equations are called simultaneous equations , and if each of the variable is of one dimension , they are known as simple simultaneous equations.

$4+1=5$

$4-1=3$

$x+y=5$

$2.5+2.5=5$

$x-y=3$

$2.5-2.5=0$

$\left.\begin{array}{l} x+y=5 \\ x-y=3 \end{array}\right\} \rightarrow$ solution $= (x,y) = (4,1)$

Simple simultaneous equation

The values of the variables by which equations are satisfied simultaneously, are called the roots or solution of simultaneous equations . Here , the equations x+y=5 and x-y=3 are simultaneous equations . Their only solution is $\boxed{x=4,y=1}$ which can be expressed by (x,y)=(4,1)

Simple simultaneous equation

POLL - 4

2

1+1=x

Higuest power

What is the dimension of this equation $2x^1 + 3y^1 = 10$? [J. B.-17]

(a) 1 (b) 2

(c) 3 (d) 4

Simple simultaneous equation

POLL - 5

Which eqution is satisfied for these values of the variables $(x, y) = (3,4)$?

$3+4 \neq 6$ $\quad\quad$ $3+4 \neq 5$

(a) $x + y = 6$ $\quad\quad$ (b) $(x + y) = 5$ ✗

(c) $(x + y) = 7$ $\quad\quad$ (d) $2x + 4 = 7$

$3+4=7$ ✓

Method of solution of simple simultaneous equations

x, y

Here , The following two methods of the solution of simple simultaneous equations of two variables have been discussed .

(1) Method of substitution.

(2) Method of Elimination.

Method of substitution.

Applying this method, we can solve the equations by following the steps below

(1)From any equation , express one variable in terms of the other variable.

(2)Substitute the value of the obtained variable in the other equation and solve the equation in one variable .

(3) Put the obtained value in any of the given equations to find the value of other variable .

$x+y=5$

$2x-3y=10$

$x+y=5 \longrightarrow y=5-x$

$x=5-y$

$2(5-y)-3y=10$

Example

Example-1: solve the equations :

$x + y = 7$

$x - y = 3$

Solution: given equations are ,

$x + y = 7$ ………(i)

$x - y = 3$ ………(ii)

Now,

$x = y + 3$ ………(iii)

From (iii) putting the value of x in (i) we get,

$y + 3 + y = 7$

or, $2y = 7 - 3$

or, $2y = 4$

$\therefore y = 2$

Here, putting y=2 in equation (iii) we get ,

$x = 2 + 3$

$\therefore x = 5$

Required solution is $(x, y) = (5,2)$

$x + y = 7$

$\therefore y = 7 - x$

$x - y = 3$

$x - 7 + x = 3$

$2x - 7 = 3$

$2x = 7 + 3$

$\therefore x = \frac{10}{2} = 5$

$y = 7 - 5$

$= 2$

Example

[If we put x=5 and y=2 in both the equations , L.H.S of (i) is $5 + 2 = 7$ =R.H.S. and L.H.S of (ii) 5-2=3=R.H.S.]

Exercise

5:- $3x - 2y = 0$
$17x - 7y = 13$

Solution: The given equations are ,

$3x - 2y = 0$ ....(i)
$17x - 7y = 13$ ....(ii)

Now,
$3x = 2y$
Or, $x = \frac{2y}{3}$ ... ... (iii)

From(iii) putting the value of x in (2) we get ,

$17 . \frac{2y}{3} - 7y = 13$ | or, $\frac{34y}{3} - 7y = 13$ | or, $\frac{34y - 21y}{3} = 13$

or, $\frac{+13y}{3} = 13$ | or, $13y = 39$ | or, $y = \frac{\cancel{39}^{3}}{\cancel{13}}$

$\therefore y = \cancel{1}3$

Now, putting the value of $y = 3$ in (3) we get ,

$x = \frac{2 \times 3}{3}$

$\therefore x = 2$

Required Solution is $(x, y) = (2,3)$

$3x - 2y = 0$
$3x = 2y$
$\therefore x = \frac{2y}{3}$

$$\begin{array}{r} 34y \\ 21y \\ \hline 13y \end{array}$$

POLL 6:

What is the solution of these equations $2x + y = 5$ and $2y = 6$? [S.B.-18]

(a) (1,3) (b) (3,0)

(c) $\left(\frac{3}{2}, 2\right)$ (d) $\left(2, \frac{3}{2}\right)$

$2y = 6$

$y = \cancel{6}/\cancel{2} = 3$

$2x + 3 = 5$

$2x = 5 - 3$

$2x = 2$

$\therefore x = 1$

Method of Elimination

Apply by this method , we can solve the equations by following the steps below:

(1) Multiply both the equations by two such separately so that the coefficients of one variable become equal .

(2) If the coefficients of a variable are of the same opposite sign , sub~~tract or~~ add the equations. The equation after subtraction (or addition) will be reduced to an equation of one variable .

(3) Find the value of a variable by the method o solution of simple equation .

(4) Put the value of a variable of the variable in any one of the given equations and find the value of the other variable .

Exercise

13: $x - y = 4$
$x + y = 6$

Solution: the given equations are

$x - y = 4 \ldots\ldots\ldots\ldots\ldots (i)$

$x + y = 6 \ldots\ldots\ldots\ldots\ldots (ii)$

$2x \quad = 10$(by adding)

Or, $x = \frac{10}{2}$

$\therefore x = 5$

Putting the value of x in equation (ii) we get ,

$5 + y = 6$

Or, $y = 6 - 5 = 1$

Required solution is $(x, y) = (5,1)$

②

$2x - 3y = 5$

$x + y = 6$ ← [Both × 2]

$2x - 3y = 5$ — (i)

$2x + 2y = 12$ — (ii)

$-2x - 2y = 5 - 12$

$-5y = -7$

$y = 7/5$

Exercise

16: $\boxed{\begin{array}{l} 3x - 2y = 5 \\ 2x + 3y = 12 \end{array}}$ — (i), (ii) → x

solution: the given equations are

$3x - 2y = 5$ … … … … . . (i)

$2x + 3y = 12$ … … … … . . (ii)

Multiplying equation (i) by 3 and equation (ii) by 2, we get

$9x - 6y = 15$ … … … … … … . (iii)

$4x + 6y = 24$ … … … … … … . (iv)

$13x \quad = 39$ (by adding)

Or, $x = \frac{39}{13}$

$\therefore x = 3$

Putting the value of x in equation (ii) ,we get

$3.2 + 3y = 12$ Or,$6 + 3y = 12$ Or, $3y = 12 - 6$

Or, $3y = 6$ Or, $y = \frac{6}{3}$ Or, $y = 2$

$\therefore y = 2$

Required solution is $\boxed{(x, y) = (3,2)}$ Ans

$6x - 4y = 10$

$6x + 9y = 36$

$y =$

$(9x - 6y) + (4x + 6y) = 15 + 24$

$= 39$

$9x - 6y + 4x + 6y = 39$

$13x = 39$

$x = 39/13 = 3$

POLL - 7

If $x + y = 5$ and $x - y = 7$, then $(x, y) =$? [R. B.-18]

(a) $(6,1)$ (b) $(6,-1)$

(c) $(1,6)$ (d) $(-1,6)$

$$\begin{aligned} x + y &= 5 \\ + \quad x - y &= 7 \\ \hline 2x &= 12 \end{aligned}$$

$\therefore x = 12/2 = 6$

$6 + y = 5$

$y = 5 - 6 = -1$

$(x, y) = (6, -1)$

Creative question:

Q-7: $A = \frac{2}{x} + \frac{1}{y}, B = \frac{4}{x} - \frac{9}{y}, C = x - y, D = px + qy.$

(a) If $C = 2, x + y = 6$, then find the value of 4xy . 2

(b) If $A = 1$ and $B = -1$,find the value of (x, y) using the method of subtraction. 4

(c) If $C = 2p$ and $D = p^2 + q^2$, find the value of (x, y) using the method of elimination. 4

লেগে থাকো সৎভাবে,
স্বপ্ন জয় তোমারই হবে

উদ্ভাস-উন্মেষ শিক্ষা পরিবার