

Hayatullah Afghan

ID: 16988

Subject: Business Mathematics

Course: BBA

Note: The MCQs are answered with red color, italic and bold options

i. The solutions of $\left|2x - \frac{-3}{5}\right| = -3$ are

(a) $x = -2, x = -0$ (b) $x = 2, x = 0$ (c) $x = -2, x = -4$ (d) $x = 5$ only (e) ***None of them***

ii. A man is going from the point $A(-5, -4)$ to the point $B(-2, 7)$ then the increments in the x and y-coordinates are

(a) $\Delta x = 6, \Delta y = 9$ (b) $\Delta x = 3, \Delta y = 11$ (c) $\Delta x = 6, \Delta y = 8$ (d) $\Delta x = -2, \Delta y = 8$ (e) ***None of them***

iii. A stair make an angle of inclination $\theta = 45^\circ$ with the horizontal then its slope is

(a) $\frac{1}{\sqrt{3}}$ (b) ***$\frac{2}{\sqrt{3}}$*** (c) $\frac{\sqrt{3}}{2}$ (d) *None of them*

iv. A painter can paint 100 m^2 wall 10 hours then the time required to paint 4000 m^2 wall will be.

(a) 60hours (b) 90 hours (c) 30 hours (d) 50 hours (e) ***None of them***

v. If 20% of sale price \$400 is equal to 50% of cost price, then the cost price will be

(a) ***\$800*** (b) \$80 (c) \$200 (d) *None of them*

vi. If $f(x) = x - 1$ and $g(x) = x^2$ then $(f \circ g)(x) =$ is

(a) x^2 (b) x^2 (c) $(x + 1)^2$ (d) ***$x^2 + 1$*** (e) *None of them*

vii. The domain of a curve $y = \sqrt{-1 - x^2}$

- (a) (-1,1) (b) (-1,1) (c) **(-1,1)** (d) (-1,1) (e) None of them

viii. The net cost equivalent for 10/30

- (a) .72 (b) .56 (c) .44 (d) .11 (e) **None of them**

ix. The equation $y = a + bx$. shows

- (a) **Linear function** (b) Linear profit function (c) Linear revenue function (d) Non of them

x. The sum of two numbers is 30 and differences is 10 then the numbers are =

- (a) (33,10) (b) (30,10) (c) (60,30) (d) 53 (e) **None of them**

Question No.2

(5)

a. Find the domain and range of the function $f \circ g(x)$ where $f \circ g(x) = f(g(x))$

$$f(x) = \sqrt{x^2 - 1} \text{ and } g(x) = x + 1$$

b. Solve the following $|3x - 3| = 4x - 2$

Answer 2 a: $f \circ g(x) = f(g(x))$

$$f(g(x)) = \sqrt{(x+1)^2 - 1} = \sqrt{x^2 + 2x + 1 - 1} = \sqrt{x^2 + 2x}$$

$$f(g(x)) = \sqrt{x^2 + 2x}$$

$$\text{Dom } f \circ g(x) = \{x/f(x) \in g(x) ; x \in IR\}$$

Answer 2.b: $|3x - 3| = 4x - 2$

$$= 3x + 3 = 4x - 2$$

$$= 3x - 4x = -2 - 3$$

$$= -x = -5$$

$$\mathbf{x = 5}$$

Question No.3 **(5)**

a. Find the inverse for the following

$$\begin{bmatrix} -5 & -6 \\ -0 & -7 \end{bmatrix}$$

b. Solve the following

$$\begin{aligned} x + 2y &= 2 \\ 3x - 5y &= 3 \end{aligned}$$

Answer 3.a:

$$A = \begin{bmatrix} -5 & -6 \\ -0 & -7 \end{bmatrix}$$

$$\text{Inverse} = A^{-1} = \frac{1}{|A|} * \text{Adj } A$$

First. $\text{Adj } A = \begin{bmatrix} -7 & 6 \\ 0 & -5 \end{bmatrix}$

Second. $|A| = \begin{vmatrix} -5 & -6 \\ -0 & -7 \end{vmatrix} = |A| = +35 - 0$

$$\mathbf{|A| = 35}$$

Third. $A^{-1}=?$

$$A^{-1} = \frac{1}{|A|} \text{Adj } A = \frac{1}{35} \begin{bmatrix} -7 & 6 \\ 0 & -5 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} \frac{-7}{35} & \frac{6}{35} \\ 0 & \frac{-5}{35} \end{bmatrix}$$

$$= A^{-1} = \begin{bmatrix} -\frac{1}{5} & \frac{6}{35} \\ 0 & -\frac{1}{7} \end{bmatrix}$$

Answer 3.b:

$$x + 2y = 2$$

$$3x - 5y = 3$$

X=?

Y=?

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

$$B = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix} = A^{-1} * B$$

First. $\text{Adj } A = \begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix}$

Second. $|A| = (-5) - 6 = -11$

Third. $A^{-1} = \frac{1}{|A|} * \text{Adj } A = \frac{1}{-11} \begin{bmatrix} -5 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} \frac{-5}{-11} & \frac{-2}{-11} \\ \frac{-3}{-11} & \frac{1}{-11} \end{bmatrix}$

$$A^{-1} = \begin{bmatrix} \frac{5}{11} & \frac{2}{11} \\ \frac{3}{11} & \frac{1}{11} \end{bmatrix}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix} = A^{-1} * B = \begin{bmatrix} \frac{5}{11} & \frac{2}{11} \\ \frac{3}{11} & -\frac{1}{11} \end{bmatrix} * \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$

$$x = \begin{bmatrix} \frac{10}{11} & + & \frac{6}{11} \\ \frac{6}{11} & + & (-\frac{3}{11}) \end{bmatrix} = \begin{bmatrix} \frac{10}{11} & + & \frac{6}{11} \\ \frac{6}{11} & - & \frac{3}{11} \end{bmatrix}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{10+6}{11} \\ \frac{6-3}{11} \end{bmatrix}$$

$$x = \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{16}{11} \\ \frac{3}{11} \end{bmatrix}$$

$$x = \frac{16}{11}$$

$$y = \frac{3}{11}$$

Question No.4

(5)

- a. At what points the function is undefined

$$f(x) = \frac{x-1}{x^2-9x+20}$$

- b. The sum of the ages of a girl and her brother is 26 years. Three years ago her age was four times the age of her brother. Find the present age of the girl and her brother.

Answer 4.a:

$$x^2 - 9 + 20 = 0$$

$$(x - 4) \quad x = 4$$

$$(x - 5) \quad x = 5$$

$$\text{Domin } f(x) = [x/x \in \mathbf{IR} \vee x \neq 4,5]$$

Answer 4.b:

Let's assume that the present age of the girl is x years and the present age of her brother is y years. According to the question, the sum of the age of a girl and her brother is **26** years.

From the given information, we derive the following equations:

$$x + y = 26$$

$$x = 26 - y \quad [\text{Eq. 1}]$$

and 3 years ago, her age was 4 times the age of her brother. So we have the equation:

$$x - 3 = 4(y - 3) \quad [\text{Eq. 2}]$$

Substituting the value of x from **Eq.1**,

$$26 - y - 3 = 4y - 12$$

$$4y + y = 26 + 12 - 3$$

$$5y = 35$$

$$y = \frac{35}{5}$$

$$\mathbf{y = 7}$$

Now, substitute the value of y in **Eq. 1**:

$$\begin{aligned}x &= 26 - y \\ &= 26 - 7 \\ &= \mathbf{19}\end{aligned}$$

Therefore, the present age of the girl is 19 years and the present age of her brother is 7 years.

Question No.5

(5)

- Find the factors of all orders of $x^4 - 16$ and $x^2 - 6x + 9$
- The manager of Roseville Appliance bought a coffee maker manufactured in Spin for \$15 and will sell it for \$18.75. find the percent markup based on cost.

Answer 5.a:

$$x^4 - 16 = x^4 - 2^4 = (x^2 - 2^2)(x^2 + 2^2)$$

$$x^2 - 6x + 9 = (x - 3)(x - 3)$$

Answer 5.b:

$$\$18.75 - \$15 = \$ 3.75$$

$$\frac{15}{100} \cdot \frac{3.75}{x} = \frac{100 \cdot 3.75}{15} \quad \mathbf{x = 25\%}$$