Subject:	**Mathematics**
Topic:	**midterm paper**
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Question No.1

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

iii) A stair makes an angle of inclination $\theta=45^0$ 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 in 10 hours. Then the time required to paint 4000 m^2 wall will be.

is (a) 60 hours(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 $(fog)(x)=$ 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 $y=\sqrt{-1-x^2}$

is (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) None of them

x) The sum of two numbers is 30 and difference is 10 then the numbers are =
(a) (33,10) (b) (30,10) (c) (60,30) (d) 53 (e)None of them

Question No.2

a. Find the domain and range of the function $fog(x)$ **where**

$fog(x) = f(g(x))$

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

Sol:

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

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

$$fog(x) = \sqrt{x^2 + 2x + \cancel{1} - \cancel{1}}$$

$$fog(x)\sqrt{x^2 + 2x}$$

$$fog(x) = \sqrt{x^2 + 2x} = 0$$

$$(\sqrt{x^2 + 2x})^2 = (0)^2$$

$$x^2 + 2x = 0$$

$$x(x + 2) = 0$$

$$x = 0 \ / \ x + 2 = 0$$

$$\boxed{x = 0} \qquad \boxed{x = -2}$$

$$Domfog(x) = \{xEIR / x = 0 / x = -2\} \qquad Rangefog(x) = \{xEIR\}$$

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

Sol:

$\# \ +(3x-3) = 4x-2$

$3x-3 = 4x-2$

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

$-x = 1$

$\boxed{x = -1}$

$\# \ -(3x-3) = 4x-2$

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

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

$-7x = -5$

$\boxed{x = \frac{5}{7}}$

Question No.3

a. Find the Inverse for the following

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

Sol:

$$\boldsymbol{A^{-1} = \frac{Adj\ A}{|A|}}$$

$$\boldsymbol{|A| = \begin{bmatrix} -5 & -6 \\ 0 & -7 \end{bmatrix} = (-5 \times -7) - (-6 \times 0) = 35}$$

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

$$\boldsymbol{A^{-1} = \frac{Adj\ a}{|A|}}$$

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

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

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

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b. Solve the following

$$x + 2y = 2$$

$$3x - 5y = 3$$

Sol:

$$3x + 6y = 6$$

$$\frac{-3x \pm -5 = 3}{11y = 3}$$

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

$$x + 2\left(\frac{3}{11}\right) = 2$$

$$x \neq \left(\frac{6}{11}\right) = 2$$

$$x - \frac{6}{11} = 2$$

$$x = 2 - \frac{6}{11}$$

$$\boxed{x = \frac{22-6}{11}}$$

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

$$s.s = \left\{\frac{16}{11}, \frac{3}{11}\right\}$$

Question No.4

a. At what points the function is undefined

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

Sol:

The following function is undefined if $x_2 - 9x + 20 \neq 0$

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

$x^2 - 4x - 5x + 20 = 0$

$x(x-4) - 5(x-4) = 0$

$(x-4)(x-5) = 0$

Points the function is undefined.

b. The sum of the ages of 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.

Sol:

Let girl be x and boy be y.

x+y=26

x=26-y

3 years ago;

boy was y-3

girl was x-3

since girl was 4 times age of girl,

x-3=4(y-3)

x-3=4y-12

since x=26-y

(26-y)-3=4y-12

23-y=4y-12

23+12=4y+y

35=5y

y=7

x=26-7

x=19

hence girl is 19years and boy is 7years

Question No.5

a. Find the factors of all orders of x^4-16 and x^2-6x+9

Sol:

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

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

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

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

AND

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

$$= x(x - 3) - 3(x - 3)$$

$$(x - 3)(x - 3)$$

b. The manager of Roseville Appliance bought a coffee maker manufactured in Spain for $ 15 and will sell it for $18.75. Find the percent of markup based on cost.

Sol:

Markup = M = $18.75 - $15 = $3.75

Percent equation: P = R × B

P = part $3.75 = R × $15

B = base R $\frac{\$3.75}{\$15} = 0.25 = 25\%$ ANS

R = rate = percent
