



Question 20

yet answered

Marked out of
0

Flag question

Find the following definite integral.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_3^0 15w^4 - 13w^2 + w dw = \boxed{-1233 / 2} //$$

$$\int_0^3 -\{15w^4 - 13w^2 + w dw\}$$

④

$$\int_0^3 -15w^4 + \int_0^3 13w^2 - \int_0^3 w dw$$

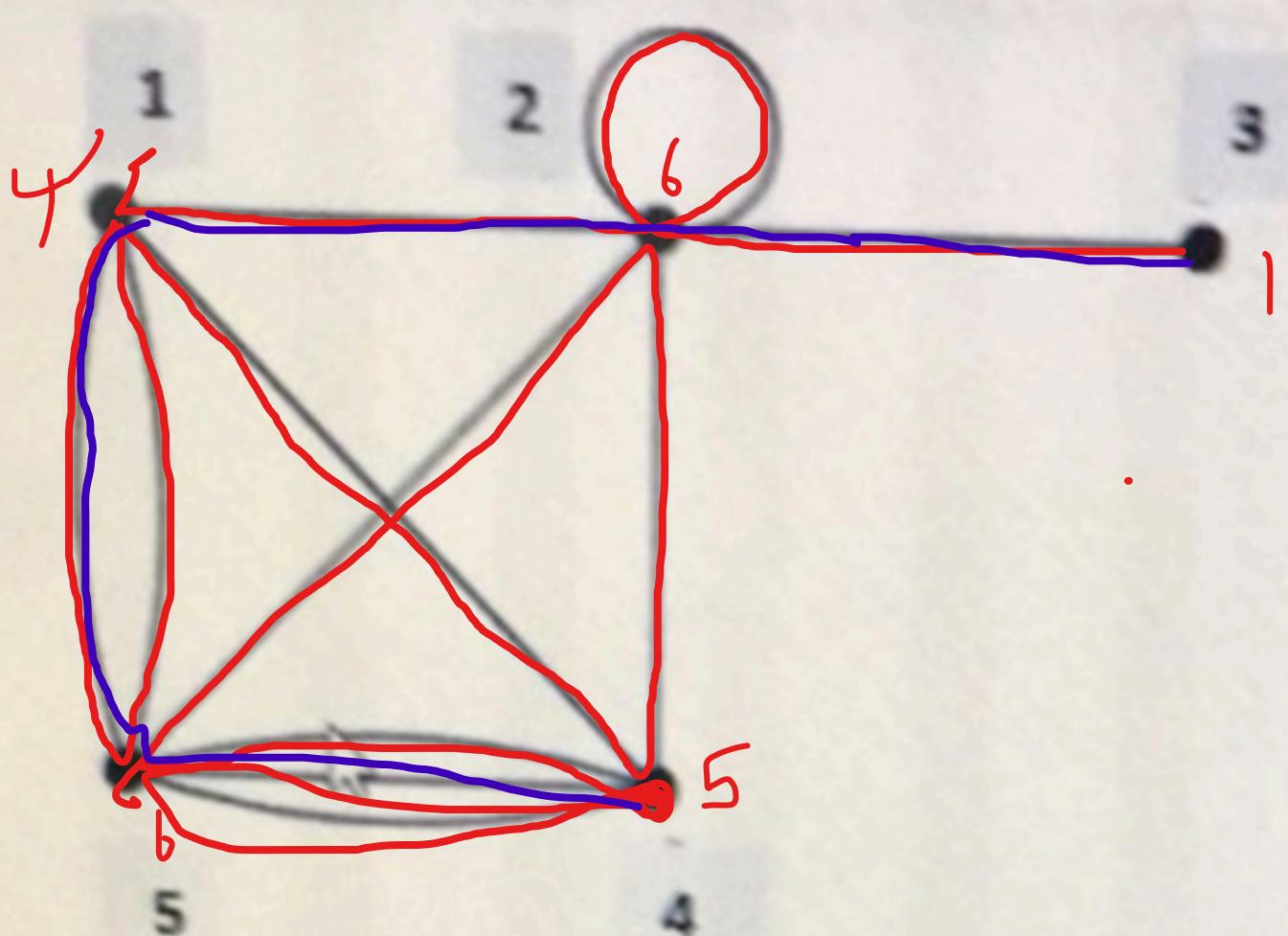
$$-\frac{1}{5} \left(\frac{w^5}{5} \right)_0^3 + 13 \left[\frac{w^3}{3} \right]_0^3 - \left[\frac{w^2}{2} \right]_0^3$$

$$-3(3^5 - 0^5) + 13 \left[\frac{3^3}{3} - 0 \right] - \left[\frac{3^2}{2} - 0 \right]$$

$$(-3 \times 243) + (13 \times 9) - \left(\frac{9}{2} \right) \left\{ -\frac{1224 - 9}{2} \right\}$$

$$-729 + 117 - \frac{9}{2} = -612 - \frac{9}{2} - \frac{123}{2} //$$

a) Determine whether the following graph has Euler path, Euler circuit or Hamilton circuit.



Euler Path =

Yes ✓

No

Euler Circuit =

Yes

No ✓

Hamilton Path =

Yes ✓

No

$$\text{Let } A = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix}$$

$$3A = \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix}$$

$$\text{Find } B = A^2 - 3A + 2I$$

$$= \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix}$$

$$2I = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$a = : 18$$

$$b = : -12$$

$$c = : -9$$

$$d = : 12$$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix} - \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$
$$= \begin{bmatrix} 18 & -12 \\ -9 & 12 \end{bmatrix} //$$

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Question 17

Not yet answered

Marked out of
1.00

Flag question

Consider the following linear system of equations.

$$2x + y - 3z = 1$$

$$3y - 2z = -1$$

$$3x + y - z = 8$$

$$= (-1)^3 \times + 6$$

a) Represent the above system of linear equations in matrix form $Ax = b$.

$$A_1 = \begin{bmatrix} 1 & 1 & -3 \\ -1 & 3 & -2 \\ 3 & 1 & -1 \end{bmatrix} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$$A = \begin{bmatrix} \frac{c_{11}}{M_{11}} & \frac{c_{12}}{M_{12}} & \frac{c_{13}}{M_{13}} \\ 2 & 1 & -3 \\ 0 & 3 & -2 \\ -3 & 1 & -1 \end{bmatrix} \quad -1 + +6 \\ b //$$

$$a = : 2 \quad b = : 1 \quad c = : -3$$

$$d = : 0 \quad e = : 3 \quad f = : -2$$

$$g = : 3 \quad h = : 1 \quad i = : -1$$

$$p = : 1$$

$$q = : -1$$

$$r = : 8$$

$$|A| = (c_{11} \times a_{11}) + (c_{12} \times a_{12}) + (c_{13} \times a_{13})$$

$$|A| = (-1 \times 2) + (6 \times 1) + (-9 \times -3)$$

b) Find the determinant of A.

c) Find x using the cramer's rule

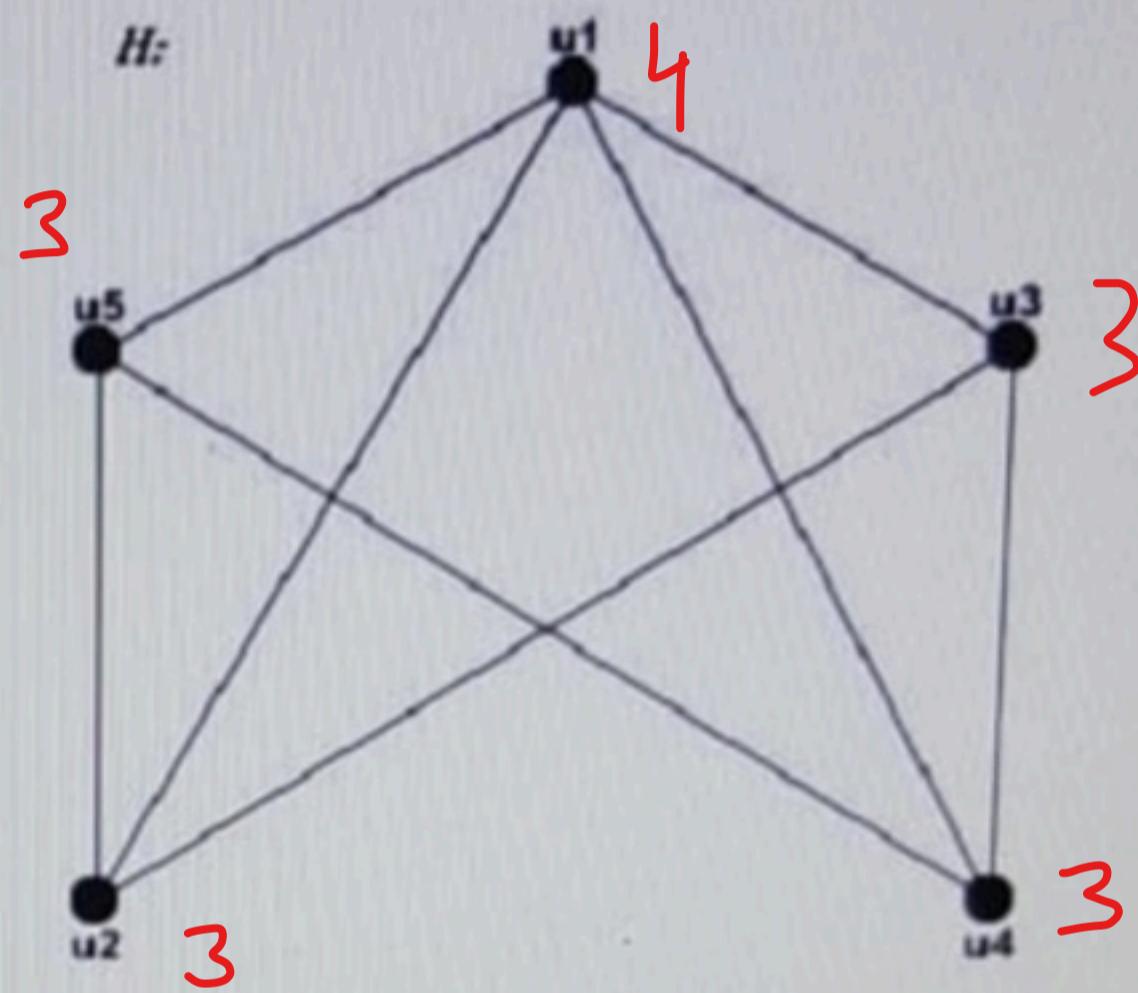
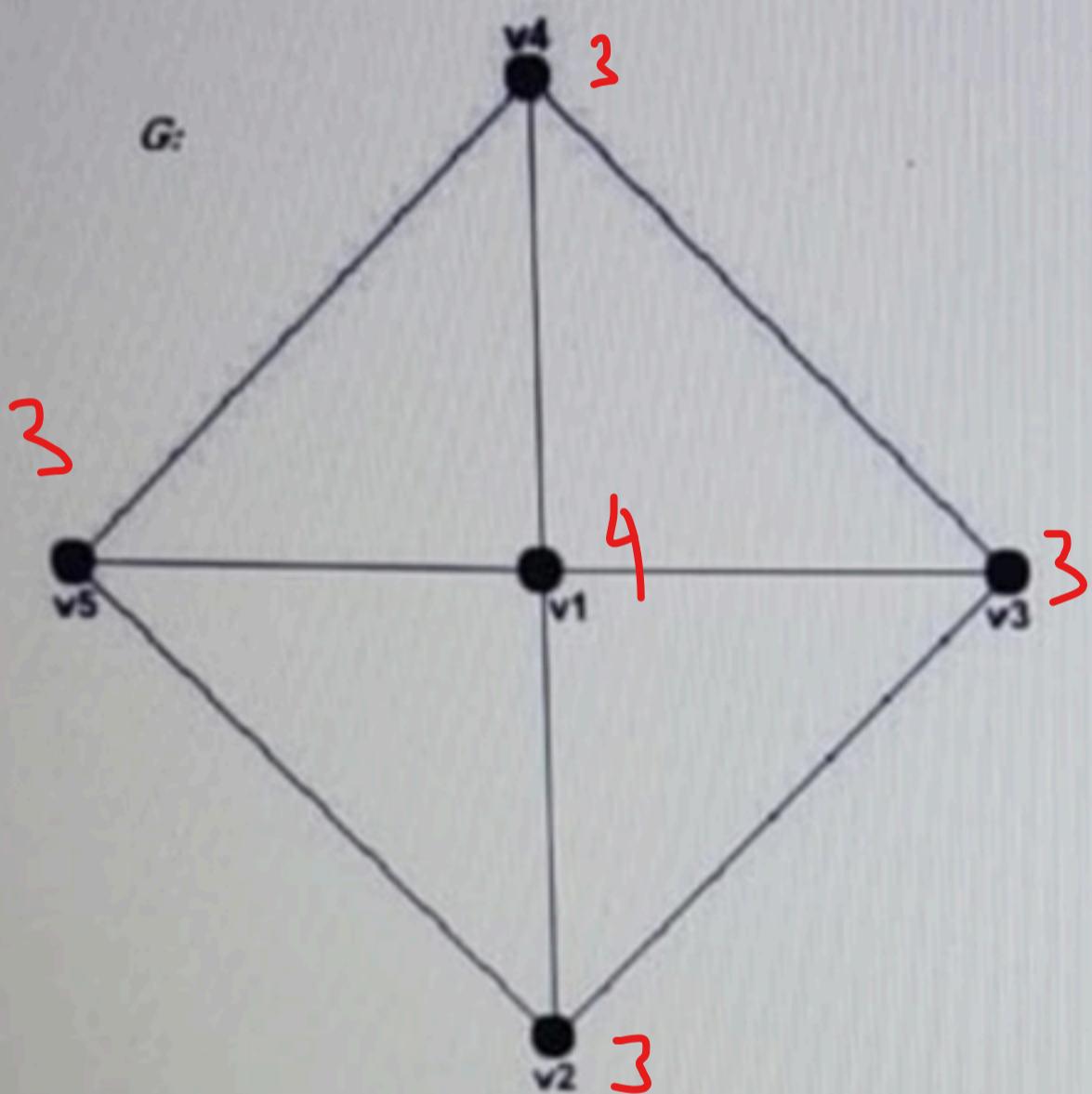
$$57 / 19 = 3$$

$$x = \frac{|A_1|}{|A|}, A_1 = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix}$$

$$= -2 + 6 + 27$$

$$= 19 //$$

Consider the following 2 graphs.



Number of Components

1

Number of Vertices

5

Number of Edges

8

Degree Sequence

4, 3, 3, 3

H

Are they isomorphic? not isomorphic

G and H are

4, 3, 3, 3

b) Write down the adjacency matrix for the above graph.

	1	2	3	4	5
1	a	b	c	d	e
2	f	g	h	i	j
3	k	l	m	n	o
4	p	q	r	s	t
5	u	v	w	x	y

a = :	<input type="text"/>	b = :	<input type="text"/>	c = :	<input type="text"/>	d = :	<input type="text"/>	e = :	<input type="text"/>
f = :	<input type="text"/>	g = :	<input type="text"/>	h = :	<input type="text"/>	i = :	<input type="text"/>	j = :	<input type="text"/>
k = :	<input type="text"/>	l = :	<input type="text"/>	m = :	<input type="text"/>	n = :	<input type="text"/>	o = :	<input type="text"/>
p = :	<input type="text"/>	q = :	<input type="text"/>	r = :	<input type="text"/>	s = :	<input type="text"/>	t = :	<input type="text"/>
u = :	<input type="text"/>	v = :	<input type="text"/>	w = :	<input type="text"/>	x = :	<input type="text"/>	y = :	<input type="text"/>

c) Degree sequence of a graph is 8, 6, 6, 4, 2, 2, 2, 2.

Does this graph exist?

Yes ✓

No

* If Total degree is even a graph can be drawn.

L -1
4

Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$y = \sqrt{x} + 8\sqrt[3]{x} - 2\sqrt[4]{x}.$$

$$y' = \frac{1}{2}x^{-1/2} + \frac{8}{3}x^{-2/3} - \frac{1}{2}x^{-3/4}$$

$$y = (n)^{1/2} + (8 \times n)^{1/3} - (2 \times (n)^{1/4})$$
$$y' = \frac{1}{2} \times n^{-1/2} + \left(8 \times \frac{1}{3} n^{-2/3}\right) - \left(2 \times \frac{1}{4} \times n^{-3/4}\right)$$

$$y' = \frac{1}{2}n^{-1/2} + \frac{8}{3}n^{-2/3} - \frac{1}{2}n^{-3/4} //$$



To buy a computer system, a customer can choose one of 8 monitors, one of 8 keyboards, one of 9 computers and one of 6 printers.

a) Determine the number of possible systems that a customer can choose from.

Answer =: 3456

b) Another customer wants to buy a 2 monitors or 2 keyboards or 3 computers.

Find the possible ways of choosing monitor, keyboard and computer.

Answer =: 140

$$8C_2 + 8C_2 + 9C_3$$

$$\frac{8}{2 \times 1} + \frac{8}{2 \times 1} + \frac{9}{3 \times 2}$$

$$\frac{5 \times 4 \times 16}{2 \times 1 \times 16} + \frac{8 \times 7 \times 16}{2 \times 1 \times 16} + \frac{9 \times 8 \times 7 \times 16}{3 \times 2 \times 1 \times 16}$$

$$28 + 28 + 84 = 140 //$$

$$\begin{aligned}
 & 8C_1 \times 8C_1 \times 9C_1 \times 6C_1 \\
 & = \frac{8}{1 \times 1} \times \frac{8}{1 \times 1} \times \frac{9}{1 \times 1} \times \frac{6}{1 \times 1} \\
 & = 8 \times 8 \times 9 \times 6 \\
 & = 3456 //
 \end{aligned}$$

$$nCr = \frac{n!}{r!(n-r)!}$$

Christy is selling tickets for an Exhibition. On the first day of the exhibition 35 adult tickets and 30 child tickets were sold for a total of 3000LKR. On the second day Christy got a revenue of 4200LKR by selling 50 adult tickets and 40 child tickets. Find the price of an adult ticket(X) and the price of a child ticket(Y).

(4) - 3

$$35 * X + 30 * Y = 3000$$

$$50 * X + 40 * Y = 4200$$

$$\begin{array}{l} 35x + 30y = 3000 \quad (1) \\ 50x + 40y = 4200 \quad (2) \\ (1) \times 4 \quad (2) \times 3 \\ 140x + 120y = 12000 \quad (3) \\ 150x + 120y = 12600 \quad (4) \end{array}$$

$$150x + 120y - 140x - 120y = 12600 - 12000$$

$$10x = 600$$

$$x = 60$$

$$50 * 60 + 40y = 4200$$

$$3000 + 40y = 4200$$

$$40y = 1200$$

$$y = 30 //$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$\begin{bmatrix} 35 & 30 \\ 50 & 40 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3000 \\ 4200 \end{bmatrix}$$

$$p = : 35 \quad q = : 30$$

$$r = : 50 \quad s = : 40$$

$$c = : 3000$$

$$d = : 4200$$



Question 15

Not answered

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Consider the following linear system of equations.

$$2x + 3y - z = 1$$

$$3x - y + 2z = 1$$

$$x + 2y + 3z = 12$$

a) Represent the above system of linear equations in matrix form

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$$\begin{aligned} a &= 2 & b &= 3 & c &= -1 \\ d &= 3 & e &= -1 & f &= 2 \\ g &= 1 & h &= 2 & i &= 3 \end{aligned} \quad \begin{bmatrix} 2 & 3 & -1 \\ 3 & -1 & 2 \\ 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 12 \end{bmatrix}$$

$$\begin{aligned} p &= 1 \\ q &= 1 \\ r &= 12 \end{aligned} \quad |A| = (2 \times -7) - (3 \times 7) + (-1 \times 7) \quad A_1 = \begin{bmatrix} 1 & 3 & -1 \\ 1 & -1 & 2 \\ 12 & 2 & 3 \end{bmatrix}$$
$$\begin{aligned} &= -14 - 21 - 7 \\ &= -42 // |A_1| = 42 \end{aligned}$$

b) Find the determinant of A.

$$n = \frac{|A_1|}{|A|} = \frac{42}{-42} = -1 //$$

c) Find x using the cramer's rule

Consider the following function.

$$f(x) = x^4 - x^2 + 20$$

1. Find $f'(-4)$: -248

2. Find the definite integral of $f(x)$ from -3 to 3: 199.2

(Round your answer to one decimal place)

$$\begin{aligned} \int_{-3}^3 x^4 - x^2 + 20 &= \left[\frac{x^5}{5} \right]_{-3}^3 - \left[\frac{x^3}{3} \right]_{-3}^3 + \left[20x \right]_{-3}^3 \\ &= \left[\frac{243}{5} - \left(-\frac{243}{5} \right) \right] - \left[\frac{27}{3} + \frac{27}{3} \right] + \left[60 + 60 \right] \end{aligned}$$

$$\begin{aligned} f'(n) &= 4n^3 - 2n^1 + 0 \\ &= 4n^3 - 2n \\ f'(-4) &= 4 \times (-4)^3 - 6 \times (-4) \\ &= -256 - (-8) \\ &= -256 + 8 \\ &= -248 // \end{aligned}$$

$\frac{486}{5} - \frac{54}{3} + 120$
 $= \frac{486}{5} + 102$



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Question 13

Not yet answered

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$$\text{Let } A = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} \quad A^2 = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} \times \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix}$$

$$\text{Find } B = A^2 - 3A + 2I \quad 3A = \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix}$$

$$B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$a = : 18$$

$$b = : -12$$

$$c = : -9$$

$$d = : 12$$

$$2I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \times 2 = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix} - \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 18 & -12 \\ -9 & 12 \end{bmatrix} //$$

Question 13

Not yet answered

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0

Flag question

$$\text{Let } A = \begin{bmatrix} 2 & 1 & 7 \\ 0 & -3 & 2 \\ 2 & 1 & 3 \end{bmatrix}$$

$$D = 2A + B - C$$

$$D = 2A + B - (B + 2A - 5I)$$

$$D = 5I$$

and $B=3A$; $C=B+2A-5I$. Find matrix D such that $D=2A+B-C$.

Assume I is the identity matrix.

$$D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- a = : 5
 b = : 0
 c = : 0
 d = : 0
 e = : 5
 f = : 0
 g = : 0
 h = : 0
 i = : 5

$$5I = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

Question 20

Not yet answered

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$$y = f(n)$$

$$y = n + 3$$

$$n = y - 3$$

$$\begin{matrix} \text{f} \\ \text{f} \in N \end{matrix}$$

N Refers to all the positive integers. (Called as Natural Numbers)

$$f(n) = n + 3$$

$$f: N \rightarrow N \quad f(n) = n + 3$$

$$\begin{aligned} f(x_1) &= x_1 + 3 \quad \text{--- (1)} \\ f(x_2) &= x_2 + 3 \quad \text{--- (2)} \end{aligned}$$

$$\text{①} = \text{②}$$

$$x_1 + 3 = x_2 + 3$$

$$x_1 = x_2 \rightarrow \text{1 to 1 function}$$

Is f a One to one function? ✓

Choose... ▾

Is f an onto function? ✗

Choose... ▾

Does f has an inverse function?

Choose... ▾

✗ .

* If the given function is one to one and onto the function is inverse. i.e. This is not an inverse Function.



Question 16

Not yet answered

Marked out of

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Flag question

Consider the following linear system of equations:

$$x + y + 2z = 3$$

$$3x + 2y - z = -1$$

$$-2x - y + z = 2$$

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

(Simplify your answer as much as possible. eg: Do not keep 2/6, write 1/3 (No common factors denominator))

a) Write down the above three equations in matrix form $Ax = b$.

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

$$\begin{bmatrix} 1 & 1 & 2 \\ 3 & 2 & -1 \\ -2 & -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}$$

$$b = \begin{bmatrix} 3 \\ -1 \\ 2 \end{bmatrix}$$

b) Consider the following. Find the values of the resulting matrix, when the following elementary

$$\begin{bmatrix} 1 & 1 & 2 & 1 & 0 & 0 \\ 3 & 2 & -1 & 0 & 1 & 0 \\ -2 & -1 & 1 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{bmatrix}$$

$$1. r_2' = r_2 - 3r_1$$

$$2. r_3' = r_3 + 2r_1$$

$$3. r_3' = r_3 + r_2$$

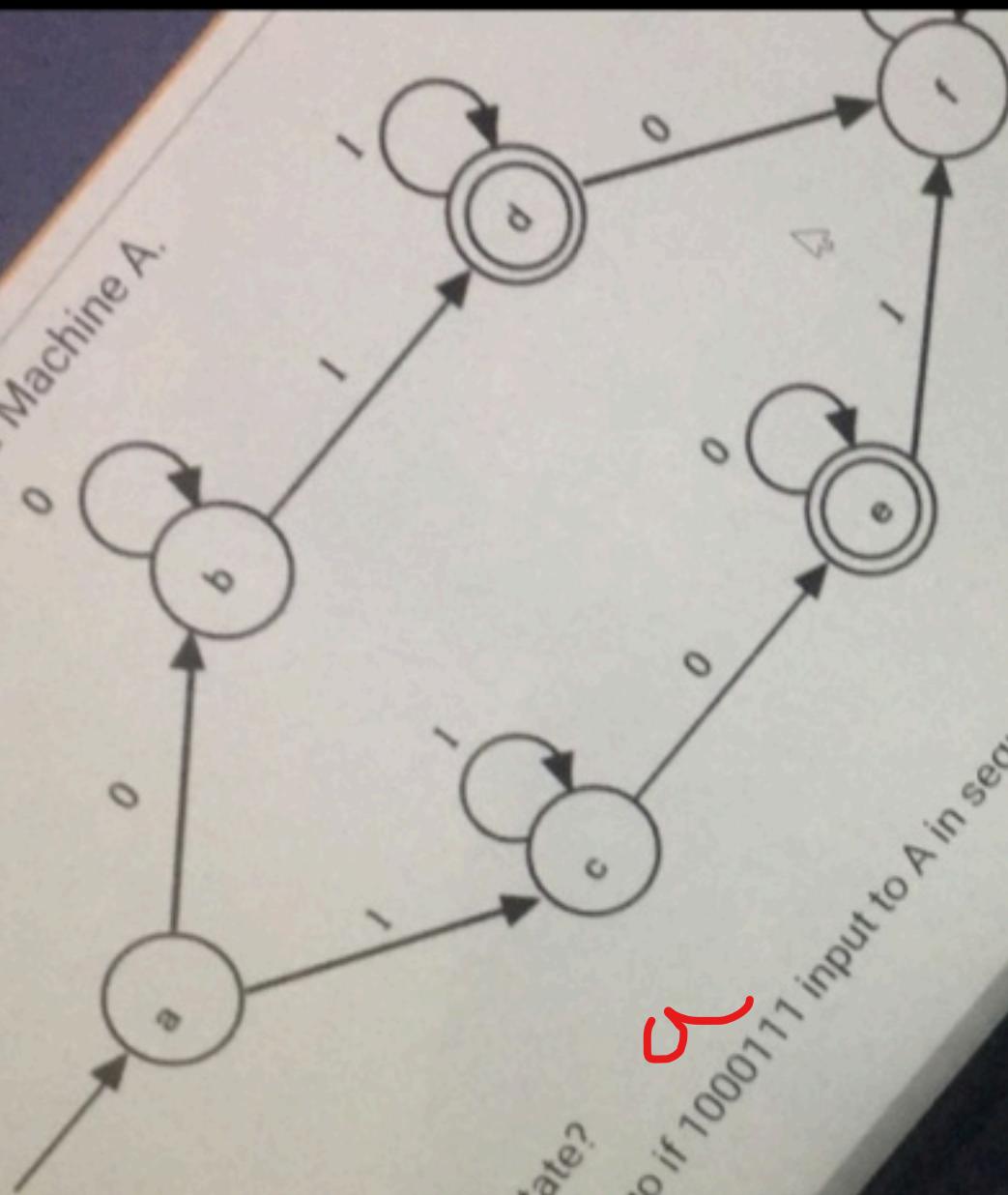
$$4. r_3' = r_3 \times \frac{1}{2}$$

$$\begin{bmatrix} 1 & 1 & 2 & 1 & 0 & 0 \\ 0 & -1 & -7 & -3 & 1 & 0 \\ 0 & 1 & 5 & 2 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 2 & 1 & 0 & 0 \\ 0 & -1 & -7 & -3 & 1 & 0 \\ 0 & 0 & -2 & -1 & 1 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 2 & 1 & 0 & 0 \\ 0 & -1 & -7 & -3 & 1 & 0 \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \end{bmatrix}$$

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under the following finite state machine A.



What is the initial State?

To what state does A go if 1000111 input to A in sequence starting from **d**?

the initial state?

and $N(d, 1)$

d

f

Question 14
Not yet answered
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Consider the following linear system of equations.

$$x + 2y - z = 1$$

$$-x + 3y - z = -4$$

$$-2x + y + 2z = 3$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & 1 \\ -1 & 3 & -1 & -4 \\ -2 & 1 & 2 & 3 \end{array} \right] \xrightarrow{\textcircled{1}} \left[\begin{array}{cccc} 1 & 2 & -1 & 1 \\ 0 & 5 & -2 & -3 \\ -2 & 1 & 2 & 3 \end{array} \right]$$

1. Write down the augmented matrix for the above system of linear equations and reduce that to echelon form.

①

$$\left[\begin{array}{cccc} a & b & c & p \\ d & e & f & q \\ g & h & i & r \end{array} \right] \xrightarrow{\textcircled{1}} \left[\begin{array}{cccc} a_1 & b_1 & c_1 & p_1 \\ d_1 & e_1 & f_1 & q_1 \\ g_1 & h_1 & i_1 & r_1 \end{array} \right]$$

②

$$\left[\begin{array}{cccc} a_1 & b_1 & c_1 & p_1 \\ d_1 & e_1 & f_1 & q_1 \\ g_1 & h_1 & i_1 & r_1 \end{array} \right] \xrightarrow{\textcircled{2}} \left[\begin{array}{cccc} a_2 & b_2 & c_2 & p_2 \\ d_2 & e_2 & f_2 & q_2 \\ g_2 & h_2 & i_2 & r_2 \end{array} \right]$$

③

$$\left[\begin{array}{cccc} a_2 & b_2 & c_2 & p_2 \\ d_2 & e_2 & f_2 & q_2 \\ g_2 & h_2 & i_2 & r_2 \end{array} \right] \xrightarrow{\textcircled{3}} \left[\begin{array}{cccc} a_3 & b_3 & c_3 & p_3 \\ d_3 & e_3 & f_3 & q_3 \\ g_3 & h_3 & i_3 & r_3 \end{array} \right]$$

④

$$\left[\begin{array}{cccc} a_3 & b_3 & c_3 & p_3 \\ d_3 & e_3 & f_3 & q_3 \\ g_3 & h_3 & i_3 & r_3 \end{array} \right] \xrightarrow{\textcircled{4}} \left[\begin{array}{cccc} 1 & 2 & -1 & 1 \\ 0 & 5 & -2 & -3 \\ 0 & 0 & 0 & 5 \end{array} \right]$$

$$r'_2 = r_2 + r_1$$

$$r'_3 = r_3 + 2r_1$$

$$r'_3 = r_3 - r_2$$

$$a = : 1 \quad a_1 = : 1 \quad a_2 = : 1 \quad a_3 = : 1$$

$$b = : 2 \quad b_1 = : 2 \quad b_2 = : 2 \quad b_3 = : 2$$

$$c = : -1 \quad c_1 = : -1 \quad c_2 = : -1 \quad c_3 = : -1$$

$$d = : -1 \quad d_1 = : 0 \quad d_2 = : 0 \quad d_3 = : 0$$

$$e = : 3 \quad e_1 = : 5 \quad e_2 = : 5 \quad e_3 = : 5$$

$$f = : -1 \quad f_1 = : -2 \quad f_2 = : -2 \quad f_3 = : -2$$

$$\left[\begin{array}{cccc} 1 & 2 & -1 & 1 \\ 0 & 5 & -2 & -3 \\ 0 & 0 & 2 & 8 \end{array} \right]$$

b) Write down the adjacency matrix for the above graph.

	1	2	3	4	5
1	a	b	c	d	e
2	f	g	h	i	j
3	k	l	m	n	o
4	p	q	r	s	t
5	u	v	w	x	y

a = : b = : c = : d = : e = :
f = : g = : h = : i = : j = :
k = : l = : m = : n = : o = :
p = : q = : r = : s = : t = :
u = : v = : w = : x = : y = :

c) Degree sequence of a graph is 5, 4, 4, 3, 3, 2, 2, 1, 1, 1.

Does this graph exist? * To draw a graph Total degree must
be even.

Yes ✓

No

Number of Edges of the above graph = : 13

No. of edges = Total degree
2

Does it has an Euler path?

Yes

No ✓

Does it has an Euler circuit? No



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Question 1

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Consider the following function.

$$f(x) = x^3 - 2x^2 + 5$$

1. Find $f'(-3)$: 39

2. Find the definite integral of $f(x)$ from -3 to 3 : -6

$$\left(\frac{x^4}{4} - \frac{2x^3}{3} + 5x \right) \Big|_{-3}^3$$

$$\begin{aligned} f(x) &= 3x^2 - (2 \times 2x) + 0 \\ f'(x) &= 3x^2 - 4x \\ f'(-3) &= (3 \times (-3)^2) - (4 \times -3) \\ &= 27 + 12 \\ &= 39 \end{aligned}$$

$$-3 - 3 = -6 //$$



Consider the following function.

$$f(x) = x^4 - x^2 + 20$$

$$\begin{aligned}f'(x) &= 4x^3 - 2x + 0 \\f'(-4) &= 4x^3 - 2x \\&= (-4)^3 - 64 + 8 \\&= -256 + 8 \\&= -248\end{aligned}$$

- Find $f'(-4)$: 248
- Find the definite integral of $f(x)$ from -3 to 3:
(Round your answer to one decimal place)

199

199.2

Consider the following linear system of equations.

$$x - 2y + 3z = -2$$

$$-2x + y - 2z = 2$$

$$3x - 3y + 7z = -2$$

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

(Simplify your answer as much as possible. eg: Do not keep 2/6, write 1/3 (No common factors should be there in numerator and denominator))

a) Write down the above three equations in matrix form $Ax = b$.

$$A = \begin{bmatrix} 1 & -2 & 3 \\ -2 & 1 & -2 \\ 3 & -3 & 7 \end{bmatrix}$$



$$b = \begin{bmatrix} -2 \\ 2 \\ -2 \end{bmatrix}$$



red
ion

Green Leaf landscaping company got two orders from a Kinder for 15 bushes and 8 trees, and the cost was 3850LKR. The second and 5 trees, and the cost was 2200LKR. Write down 2 equations to and a tree (Y).

$$15 * X + 8 * Y = 3850$$

$$8 * X + 5 * Y = 2200$$



a) Write the above 2 equations in matrix form $Ax = b$. (According to)

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$\begin{bmatrix} 15 & 8 \\ 8 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3850 \\ 2200 \end{bmatrix}$$

$$p = : 15 \quad q = : 8$$

$$r = : 8 \quad s = : 5$$

$$c = : 3850$$

$$d = : 2200$$



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3
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1 out of
g question

Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$f(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} + 6\sqrt[3]{x^8} - 3$$

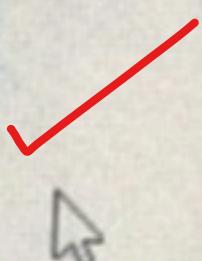
$$f'(x) = 6 \boxed{x^{-2/5}} - \boxed{7/2} x^{5/2} + 16 x^{\boxed{5/3}}$$

$$f(x) = 10(x^3)^{1/5} - (x^7)^{1/2} + 6(x^8)^{1/3} - 3$$

$$f(x) = 10x^{3/5} - x^{7/2} + 6x^{8/3} - 3$$

$$f'(x) = \cancel{10} \times \frac{3}{5} x^{-2/5} - \frac{7}{2} x^{5/2} + \cancel{6} \times \frac{8}{3} x^{5/3} - 0$$

$$f'(x) = 6x^{-2/5} - \frac{7}{2} x^{5/2} + 16x^{5/3}$$



b) Consider the following. Find the values of the resulting entries after the elementary row operations are applied in the given order.

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ 0 & -3 & 4 & 2 & 1 & 0 \\ 0 & 3 & -2 & -3 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ -2 & 1 & -2 & 0 & 1 & 0 \\ 3 & -3 & 7 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{bmatrix}$$

$$1. r'_2 = r_2 + 2r_1$$

$$2. r'_3 = r_3 - 3r_1$$

$$3. r'_3 = r_3 + r_2$$

$$4. r'_3 = r_3 \times \frac{1}{2}$$

$$5. r'_2 = r_2 - 4r_3$$

$$6. r'_2 = r_2 \times -\frac{1}{3}$$

$$7. r'_1 = r_1 - 3r_3$$

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ 0 & -3 & 4 & 2 & 1 & 0 \\ 0 & 0 & 2 & -1 & 1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 1 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \\ a = & 1 & & & & \\ d = & 0 & 1 & & & \\ g = & 0 & 0 & 1 & & & \\ j = & \frac{5}{2} & & & & \\ m = & -\frac{4}{3} & & & & \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ 0 & -3 & 0 & 4 & -1 & -2 \\ 0 & 0 & 1 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ 0 & 1 & 0 & -\frac{4}{3} & \frac{1}{3} & \frac{2}{3} \\ 0 & 0 & 1 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 0 & \frac{5}{2} & -\frac{3}{2} & -\frac{3}{2} \\ 0 & 1 & 0 & -\frac{4}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & 0 & 1 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 0 & \frac{5}{2} & -\frac{3}{2} & -\frac{3}{2} \\ 0 & 1 & 0 & -\frac{4}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & 0 & 1 & -\frac{1}{2} & \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

If $|A| = 43$ then find the cofactor matrix of A.

$$A = \begin{bmatrix} 1 & 2 & 7 \\ 4 & -3 & x \\ 2 & 2 & 5 \end{bmatrix}$$

$$\begin{aligned} |A| &= 1 \times (-15 - 2x) \\ &\quad - 2 \times (20 - 2x) + 7(8 + x) \end{aligned}$$

$$43 = -15 - 2x - 40 + 4x + 56 + 4x$$

$$43 = 43 + 2x$$

$$2x = 0$$

$$x = 0$$

$$C_{11} = (-1)^1 \times -15 = -15$$

$$C_{12} = (-1)^3 \times 20 = -20$$

$$C_{13} = (-1)^4 \times 14 = 14$$

$$C_{21} = (-1)^2 \times -4 = 4$$

$$C_{22} = (-1)^4 \times -9 = -9$$

$$C_{23} = (-1)^5 \times -2 = 2$$

C_{11}

Choose...

Choose...

20

-20

-11

15

21

2

3

14

13

28

-4

9

-15

11

4

-9

-14

-21

C_{21}

Choose...

28

-4

9

-15

11

4

-9

-14

-21

C_{22}

Choose...

C_{23}

Consider the following function.

$$f(x) = x^5 + 2x^3 - 5$$

$$\begin{aligned} f'(x) &= 5x^4 + 2x^3 - 0 \\ f'(x) &= 5x^4 + 6x^2 \\ f'(-2) &= \frac{5 \times 16 + 6 \times 4}{80 + 24} \\ &= 104/11 \end{aligned}$$

1. Find $f'(-2)$: 104

2. Find the definite integral of $f(x)$ from -2 to 2 : -20

$$\int_{-2}^2 x^5 + 2x^3 - 5 \, dx = \left[\frac{x^6}{6} + \frac{2x^4}{4} - 5x \right]_{-2}^2$$
$$= \left[\frac{64}{6} + 8 - 10 \right] - \left[\frac{4}{6} + 8 + 10 \right] = -20$$

a3 = : -1 a4 = : 1

c) Find the determinant of A. : 2

d) Find the adjoint of A.

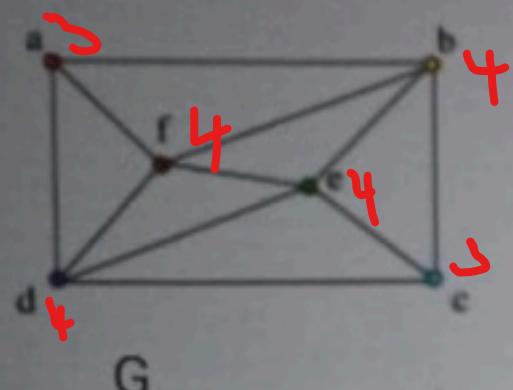
$$adj\ A = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$$

p = : 0.5 q = : -0.5

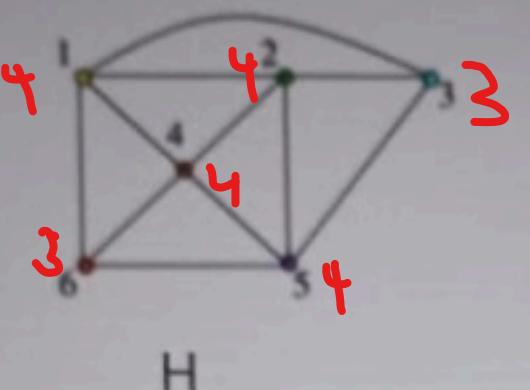
r = : 0.5 s = : 0.5

d) Find the two-digit number. : 78

Consider the following 2 graphs.



G



H

Number of Components

Number of Vertices

Number of Edges

Degree Sequence

4	4	4	4	3	3	4	4	4	4	3	3
---	---	---	---	---	---	---	---	---	---	---	---

Are they isomorphic?

G and H are

- Isomorphic ✓
- Not Isomorphic

b) Find the determinant of A. : 18

c) Find x using the cramer's rule.

$$x = \frac{|A_1|}{|A|}, A_1 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$a = : 5 \quad b = : 2 \quad c = : 1$$

$$d = : 4 \quad e = : 3 \quad f = : -3$$

$$g = : 8 \quad h = : 4 \quad i = : 2$$

$$|A_1| = : 18$$

$$x = : 1$$

d) Find y using the cramer's rule.

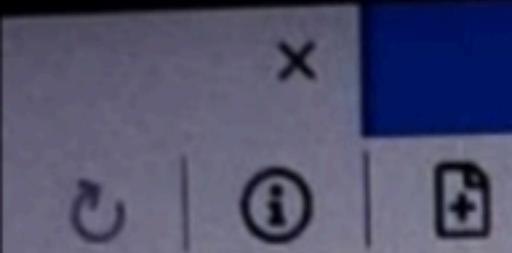
$$y = \frac{|A_2|}{|A|}, A_2 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$a = : 1 \quad b = : 5 \quad c = : 1$$

$$d = : -2 \quad e = : 4 \quad f = : 3$$

$$g = : 0 \quad h = : 3 \quad i = : 2$$

$$|A_2| = : 25$$



NetExam

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$$f(x) = (x^2 - 5)(x^3 - 2x + 3)$$

$$\begin{aligned}f'(x) &= (x^2 - 5)(3x^2 - 2) \\&\quad + (2x)(x^3 - 2x + 3) \\f'(x) &= (-1 \times 10) + (-4 \times -1) \\&= -10 + 4\end{aligned}$$

Find $f'(-2)$.

Hint : Differentiate the function and Substitute -2. $= -6 //$

(No spaces should be in the answer)

Answer:

-6





on 19

et answered

ed out of

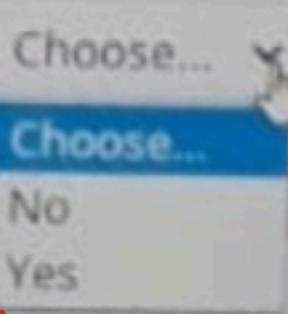
ag question

N Refers to all the positive integers. (Called as Natural Numbers)

Natural number (+)

$$f: N \rightarrow N \quad f(n) = x^2 - 3$$

Is f a One to one function?



Is f an onto function?



Does f has an inverse function?



$$f(x_1) = x_1^2 - 3 \quad \textcircled{1}$$

$$f(x_2) = x_2^2 - 3 \quad \textcircled{2}$$

$$\textcircled{1} = \textcircled{2}$$

$$x_1^2 - 3 = x_2^2 - 3$$

$$x_1^2 - x_2^2 = 0$$

$$x_1^2 = x_2^2$$

$$y = f(n)$$

$$y = x^2 - 3$$

$$x^2 = y + 3$$

$$x = \pm\sqrt{y+3}$$



on 16

not answered
out of

g question

Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$y = \sqrt{x} + 8\sqrt[3]{x} - 2\sqrt[4]{x}$$

$$y' = \frac{1}{2} x^{-1/2} + \frac{8}{3} x^{-2/3} - \frac{1}{2} x^{-3/4}$$

$$y = (x)^{1/2} + 8(x)^{1/3} - 2(x)^{1/4}$$

$$y' = \frac{1}{2} x^{-1/2} + \frac{8}{3} x^{-2/3} - \frac{1}{2} x^{-3/4}$$

$$y' = \frac{1}{2} x^{-1/2} + \frac{8}{3} x^{-2/3} - \frac{1}{2} x^{-3/4}$$

b) Write down the adjacency matrix for the above graph.

$$\begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} a & b & c & d & e \\ f & g & h & i & j \\ k & l & m & n & o \\ p & q & r & s & t \\ u & v & w & x & y \end{bmatrix} \end{matrix}$$

$$\begin{aligned} a &= : \square & b &= : \square & c &= : \square & d &= : \square & e &= : \square \\ f &= : \square & g &= : \square & h &= : \square & i &= : \square & j &= : \square \\ k &= : \square & l &= : \square & m &= : \square & n &= : \square & o &= : \square \\ p &= : \square & q &= : \square & r &= : \square & s &= : \square & t &= : \square \\ u &= : \square & v &= : \square & w &= : \square & x &= : \square & y &= : \square \end{aligned}$$

c) Degree sequence of a graph is 7, 6, 5, 4, 2, 2, 2, 1, 1, 1, 1.

Does this graph exist?

Yes

No

Number of Edges of the above graph = :

Does it has an Euler path?

Yes

Let $A = \begin{bmatrix} 5 & -5 & 4 \\ 0 & 3 & 2 \\ 1 & 0 & 7 \end{bmatrix}$

and $B=3A$; $C=B+2A-5I$. Find matrix D such that $D=2A+B-C$.

Assume I is the identity matrix.

$$D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$a = : 5$
 $b = : 0$
 $c = : 0$
 $d = : 0$
 $e = : 5$
 $f = : 0$
 $g = : 0$
 $h = : 0$

$i = 5$

$$\begin{aligned} D &= 2A + B - C \\ D &= 2A + B - (B + 2A - 5I) \\ D &= 5I \end{aligned}$$

$$D = 5 \times \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$D = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

Green Leaf landscaping company got two orders from a Kindergarten. The first order was for 15 bushes and 8 trees, and the cost was 3850LKR. The second order was for 8 bushes and 5 trees, and the cost was 2200LKR. Write down 2 equations to find the cost of a bush (X) and a tree (Y).

$$15 \cdot X + 8 \cdot Y = 3850$$

$$8 \cdot X + 5 \cdot Y = 2200$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix}, x = \begin{bmatrix} t \\ u \end{bmatrix}, b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$\begin{bmatrix} 15 & 8 \\ 8 & 5 \end{bmatrix} \begin{bmatrix} X \\ Y \end{bmatrix} = \begin{bmatrix} 3850 \\ 2200 \end{bmatrix}$$

$$p = 15, q = 8$$

$$r = 8, s = 5$$

$$c = 3850$$

$$d = 2200$$

b) Find the cofactor matrix(C) of A .

$$C = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

b) Find the cofactor matrix(C) of A .

$$C = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

$$a_{11} = 5, a_{12} = -8$$

$$a_{21} = -8, a_{22} = 15$$

$$c_{11} = (-1)^2 \times 5 = 5$$

$$c_{12} = (-1)^3 \times 8 = -8$$

$$c_{21} = (-1)^3 \times 8 = -8$$

$$c_{22} = (-1)^4 \times 15 = 15$$

$$\begin{bmatrix} 5 & -8 \\ -8 & 15 \end{bmatrix}$$

co-factor matrix

c) Find the determinant of A . : 11

$$|A| = (15 \times 5) + (8 \times -8)$$

d) Find the adjoint of A .

$$|A| = 75 - 64$$

$$adj A = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$$

$$p = 5, q = -8$$

$$r = -8, s = 15$$

d) Find the two-digit number. : 15

$$\text{Adjoint of } A =$$

$$\begin{bmatrix} 5 & -8 \\ -8 & 15 \end{bmatrix}$$

$\frac{45}{\therefore}$

$$y = \frac{5x - 15}{2}$$

$$2y = 5x - 15$$

$$5x = 2y + 15$$

$$x = \frac{2y + 15}{5}$$

$$g^{-1}(x) = \frac{2x + 15}{5}$$

$$g^{-1}(5) = \frac{25}{5} = 5 //$$

Consider the following function.

$$g: R \rightarrow R \quad g(x) = \frac{(5x - 15)}{2}$$

Find $g^{-1}(5)$

Hint: Find the inverse of g and substitute 5.

Answer: 52

5

a) Obtain the truth table for the following expression.

$$D = ABC + A\bar{B}\bar{C} + \bar{A}BC$$

A	B	C	ABC	$\bar{A}\bar{B}\bar{C}$	$\bar{A}BC$	D
0	0	0	0	0	1	1
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	0	0	0	0
1	0	0	0	1	0	1
1	0	1	0	0	0	0
1	1	0	0	0	0	0
1	1	1	1	0	0	1

b) Simplify the above expression (D) using the following boolean identities. In front of each step write down the reason (Number of the boolean identity according to following numbers).

Consider the following Boolean identities.

1. Double Complement Law
2. Idempotent Law
3. Identity Law
4. Universal Bound Law
5. Commutative Law
6. Associative Law
7. Distributive Law
8. De Morgan's Law
9. Absorption Law
10. Inverse Law

$$\bar{A}BC + \bar{A}BC + \bar{A}\bar{B}C$$

$$= \bar{A}B(\bar{C} + C) + \bar{A}BC \quad 1 \quad 7$$

$$= \bar{A}B \cdot 1 + \bar{A}BC \quad 10$$

$$= \bar{A}B + \bar{A}BC \quad 3$$

$$= \bar{A}(B + BC) \quad 4$$

7

$$A^2 = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} 7 & 2 \\ 3 & 6 \end{bmatrix} \quad 3A = 3 \times \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} 3 & 6 \\ 9 & 0 \end{bmatrix}$$

Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$

Find $B = A^2 - 3A + 2I$

$B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

a = : 6
 b = : -4
 c = : -6
 d = : 8

$$2I = 2 \times \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 7 & 2 \\ 3 & 6 \end{bmatrix} - \begin{bmatrix} 3 & 6 \\ 9 & 0 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 6 & -4 \\ -6 & 8 \end{bmatrix}$$

Find the derivative of the following function.
 (If your answer is not an integer, then write it as a quotient (eg: 2/5))

$f(x) = 10\sqrt[5]{x^3} - \sqrt{x^7} + 6\sqrt[3]{x^8} - 3$

$f'(x) = 6x^{-2/5} - \frac{7}{2}x^{5/2} + 16x^{5/3}$

Simplify the following boolean expression.

$$(A + \bar{B})(\bar{B} + C + \bar{B})((B + D) + (\bar{B} + C + B)) + A(B + C)$$

Select one:

- B
- A+B+C
- 1
- A(B+C)
- None of the above

Find the following definite integral.
 (If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_1^4 \frac{8}{\sqrt{t}} - 12\sqrt{t^3} dt = \frac{-664}{5}$$

$$\begin{aligned} & \left[8t^{1/2} - 12t^{3/2} \right]_1^4 \\ &= \left[8 + t^{1/2} \right]_1^4 - \left[12 + t^{5/2} \right]_1^4 \\ &= [32 - 16] - \left[\frac{768}{5} - \frac{24}{5} \right] \\ &= 16 - \frac{744}{5} \\ &= -\frac{664}{5} \end{aligned}$$

check

Consider the function $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = x^2$.

a) Is this a one-to-one function?

Yes
 No

$$f(x_1) = x_1^2 - 0 \quad \text{①} = \text{②}$$

$$f(x_2) = x_2^2 - 0 \quad x_1^2 = x_2^2$$

b) Is this an on to function?

Yes
 No

$$y = f(x) \quad y = x^2$$

$$x = \pm \sqrt{y}$$

b) Does the inverse exist?

Yes
 No

b) What is the inverse function?

$y = x^{1/2}$
 $y = x^2$
 $y = x+1$
 Does not exist

If $|A| = 128$ then find the cofactor matrix of A.

$$A = \begin{bmatrix} x & 5 & 7 \\ 2 & 4 & 1 \\ -2 & 8 & 3 \end{bmatrix}$$

$$|A| = (x \times 4) - (5 \times 8) + (7 \times 24)$$

$$128 = 4x - 40 + 168$$

$$x = 0$$

C_{11} Choose... 4 $C_{11} = (-1)^{1+1} \times 4 = 4$

C_{12} Choose... -8 $C_{12} = (-1)^{1+2} \times 8 = -8$

C_{13} Choose... 24 $C_{13} = (-1)^{1+3} \times 24 = 24$

C_{21} Choose... 41 $C_{21} = (-1)^{2+1} \times -41 = 41$

C_{22} Choose... 14 $C_{22} = (-1)^{2+2} \times 14 = 14$

C_{23} Choose... -10 $C_{23} = (-1)^{2+3} \times 10 = -10$

b) Consider the following. Find the values of the resulting matrix order.

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 3 & -2 & 3 & 0 & 1 & 0 \\ 2 & -3 & 2 & 0 & 0 & 1 \end{bmatrix} \xrightarrow{\textcircled{1}} \begin{bmatrix} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 0 & 0 & 0 \\ 0 & 4 & 6 & -3 & 1 & 0 \\ 2 & -3 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 0 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \\ 0 & 1 & 0 & 0 & 0 & \frac{-3}{5} \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

$$1. r_2' = r_2 - 3r_1$$

$$2. r_3' = r_3 - 2r_1$$

$$3. r_3' = r_3 - \frac{1}{4}r_2$$

$$4. r_2' = r_2 \times \frac{2}{5}$$

$$5. r_2' = r_2 - 6r_3$$

$$6. r_2' = r_2 \times \frac{1}{4}$$

$$7. r_1' = r_1 + r_3$$

$$a = 1, b = -2, c = 0$$

$$d = 0, e = 1, f = 0$$

$$g = 0, h = 0, i = 1$$

$$j = -\frac{1}{2}, k = -\frac{1}{10}, l = \frac{2}{5}$$

$$m = 0, n = \frac{2}{5}, o = -\frac{3}{5}$$

$$p = -\frac{1}{2}, q = -\frac{1}{10}, r = \frac{2}{5}$$

$$\begin{bmatrix} 1 & -2 & -1 & 0 & 0 & 0 \\ 0 & 4 & 6 & -3 & 1 & 0 \\ 0 & 1 & 4 & -2 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & \frac{2}{5} & -\frac{3}{5} \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 0 & 0 & 0 \\ 0 & 4 & 6 & -3 & 1 & 0 \\ 0 & 0 & \frac{5}{2} & -\frac{5}{4} & -\frac{1}{4} & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 0 & 4 & 0 & 0 & \frac{8}{5} & -\frac{12}{5} \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 0 & 4 & 6 & -3 & 1 & 0 \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 0 & 4 & 6 & -3 & 1 & 0 \\ 0 & 0 & 1 & -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

c) Using the answer in (b), find the inverse of the coefficient matrix

$$A^{-1} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = \begin{bmatrix} -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \\ 0 & \frac{2}{5} & -\frac{3}{5} \\ -\frac{1}{2} & -\frac{1}{10} & \frac{2}{5} \end{bmatrix}$$

b) Find the determinant of A:

c) Find x using the cramer's rule.

$$x = \frac{|A_1|}{|A|}, A_1 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$a = \boxed{}, b = \boxed{}, c = \boxed{}$$

$$d = \boxed{}, e = \boxed{}, f = \boxed{}$$

$$g = \boxed{}, h = \boxed{}, i = \boxed{}$$

$$|A_1| = \boxed{}$$

$$x = \boxed{}$$

X

d) Find y using the cramer's rule.

$$y = \frac{|A_2|}{|A|}, A_2 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$g = \boxed{}, h = \boxed{}, i = \boxed{}$$

Consider the function $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = x^2 + 6$

a) Is this a one-to-one function?

Yes

No

b) Is this an onto function?

Yes

No

b) Does the inverse exist?

Yes

No

b) What is the inverse function?

$f^{-1}(x) = (x-6)^{\frac{1}{2}}$

$f^{-1}(x) = 1/(x-6)^{\frac{1}{2}}$

$f^{-1}(x) = (x-6)^2$

Does not exist

Find the following definite integral.

If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_1^4 \frac{8}{\sqrt{t}} - 12\sqrt{t^3} dt = \boxed{664/5}$$



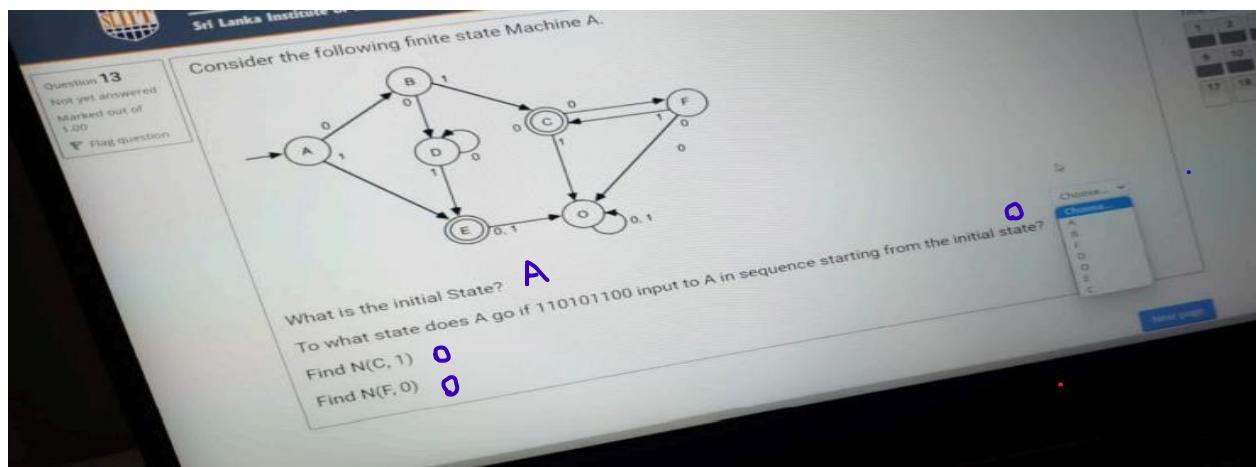
N Refers to all the positive integers. (Called as Natural Numbers)

$$f: N \rightarrow N \quad f(n) = n + 3$$

Is f a One to one function?

Is f an onto function?

Does f has an inverse function?



Consider the following linear system of equations.

$$\begin{aligned}x + y - z &= -3 \\2x + 3y + z &= 1 \\x - 4y - z &= 7\end{aligned}$$

a) Represent the above system of linear equations in matrix form $Ax = b$.

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$a = : 1$ $b = : 1$ $c = : -1$
 $d = : 2$ $e = : 3$ $f = : 1$
 $g = : 1$ $h = : -4$ $i = : -1$
 $p = : -3$
 $q = : 1$
 $r = : 7$

$$\begin{bmatrix} 1 & 1 & -1 \\ 2 & 3 & 1 \\ 1 & -4 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -3 \\ 1 \\ 7 \end{bmatrix}$$

Consider the function $f: R \rightarrow R$ $f(x) = x^2 + 5$

a) Is this a one-to-one function?

Yes
 No

b) Is this an on to function?

Yes
 No

b) Does the inverse exist?

Yes
 No

b) What is the inverse function?

$f^{-1}(x) = (x-5)^{1/2}$
 $f^{-1}(x) = 1/((x-5)^{1/2})$
 $f^{-1}(0) = (x-5)^2$
 Does not exist

b) Consider the following. Find the values of the resulting matrix, when the following elementary row operations are applied in the given order.

$$\begin{bmatrix} 1 & -2 & -1 & 1 & 0 & 0 \\ 3 & -2 & 3 & 0 & 1 & 0 \\ 2 & -3 & 2 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{bmatrix}$$

$$1. r'_2 = r_2 - 3r_1$$

$$2. r'_3 = r_3 - 2r_1$$

$$3. r'_3 = r_3 - \frac{1}{4}r_2$$

$$4. r'_3 = r_3 \times \frac{2}{5}$$

$$5. r'_2 = r_2 - 6r_3$$

$$\Downarrow$$

$$6. r'_2 = r_2 \times \frac{1}{4}$$

$$7. r'_3 = r_3 + r_2$$

$$a = 1, b = -2, c = 0$$

$$d = 0, e = 1, f = 0$$

$$g = 0, h = 0, i = 1$$

$$j = -1/2, k = -1/10, l = 2/15$$

$$m = 0, n = 2/15, o = -3/15$$

$$p = -1/2, q = -1/10, r = 2/15$$

the coefficient matrix A.

N Refers to all the positive integers. (Called as Natural Numbers)

$$f: N \rightarrow N \quad f(n) = x^5 - 2x + 1$$

Is f a One to one function?

Choose...

- No
- Yes

Is f an onto function?

Does f has an inverse function? Choose...

Find the following definite integral.

$$\int_{2}^{5} |4x - 5| dx$$

$$|4x - 5| = \begin{cases} (4x - 5), & x > 5/4 \\ -(4x - 5), & x \leq 5/4 \end{cases}$$

$$\int_{2}^{5} 4x - 5 = \left[\frac{4x^2}{2} \right]_2^5 - [5x]_2^5$$

$$= [50 - 8] - [25 - 10]$$

$$= 42 - 15$$

$$= 27 //$$

Answer: 27

(Please remove spaces from the answer)

Consider the following linear system of equations.

$$x + 2y + z = 5$$

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

$$4y + 2z = 8$$

a) Represent the above system of linear equations in matrix form:

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$$a = : 1 \quad b = : 2 \quad c = : 1$$

$$d = : -2 \quad e = : 3 \quad f = : -3$$

$$g = : 0 \quad h = : 4 \quad i = : 2$$

$$p = : 5$$

$$q = : 4$$

$$r = : 8$$

$$\begin{bmatrix} 1 & 2 & 1 \\ -2 & 3 & -3 \\ 0 & 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \\ 8 \end{bmatrix}$$

b) Find the determinant of A. : 18

Sri Lanka Institute of Information Technology

a) Determine whether the following graph has Euler path, Euler circuit, Hamilton path or Hamilton circuit.

Euler Path = Yes No

Euler Circuit = Yes No

Hamilton Circuit = Yes

Hamilton Path = Yes

hp

$$A^2 = \begin{bmatrix} 0 & 1 \\ -1 & 5 \end{bmatrix} \times \begin{bmatrix} 0 & 1 \\ -1 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} -1 & 5 \\ -5 & 24 \end{bmatrix}$$

$$3A = \begin{bmatrix} 0 & 3 \\ -3 & 15 \end{bmatrix} \quad 2I = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} -1 & 5 \\ -5 & 24 \end{bmatrix} - \begin{bmatrix} 0 & 3 \\ -3 & 15 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 2 \\ -2 & 1 \end{bmatrix}$$

Let $A = \begin{bmatrix} 0 & 1 \\ -1 & 5 \end{bmatrix}$

Find $B = A^2 - 3A + 2I$

$B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

a = 1
b = 2
c = -2
d = 11

Consider the following linear system of equations.

$$\begin{aligned} x - 2y + 3z &= -2 \\ -2x + y - 2z &= 2 \\ 3x - 3y + 7z &= -2 \end{aligned}$$

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

(Simplify your answer as much as possible. eg: Do not keep 2/6, write there in numerator and denominator))

a) Write down the above three equations in matrix form $Ax = b$.

$$A = \begin{bmatrix} 1 & -2 & 3 \\ -2 & 1 & -2 \\ 3 & -3 & 7 \end{bmatrix} \quad \begin{bmatrix} 1 & -2 & 3 \\ -2 & 1 & -2 \\ 3 & -3 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -2 \\ 2 \\ -2 \end{bmatrix}$$

b = $\begin{bmatrix} -2 \\ 2 \\ -2 \end{bmatrix}$

b) Consider the following. Find the values of the resulting matrix, when the operations are applied in the given order.

$$\begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ -2 & 1 & -2 & 0 & 1 & 0 \\ 3 & -3 & 7 & 0 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{bmatrix}$$

$$1. r_2' = r_2 + 2r_1$$

$$\rightarrow \begin{bmatrix} 1 & -2 & 3 & 1 & 0 & 0 \\ 0 & -3 & 2 & 2 & 1 & 0 \\ 3 & -3 & 7 & 0 & 0 & 1 \end{bmatrix}$$

$$\frac{5C_1 \times 8C_1 \times 7C_1 \times 6C_1}{11 \times 14} \times \frac{18}{11 \times 17} \times \frac{17}{11 \times 16} \times \frac{16}{11 \times 15} = \frac{5 \times 14}{1 \times 14} \times \frac{8 \times 17}{1 \times 17} \times \frac{7 \times 16}{1 \times 16} \times \frac{6 \times 15}{1 \times 15} \\ = 1680 //$$

To buy a computer system, a customer can choose one of 5 monitors, one of 8 keyboards, one of 7 computers and one of 6 printers.

a) Determine the number of possible systems that a customer can choose from.

Answer = : 1680

$$nCr = \frac{n!}{r!(n-r)!}$$

b) Another customer wants to buy a monitor or 2 keyboards or a computer.

Find the possible ways of choosing monitor, keyboard and computer.

Answer = : 40

$$\frac{5}{11 \times 14} + \frac{8}{12 \times 16} + \frac{7}{11 \times 16} = \frac{5 \times 14}{1 \times 14} + \frac{8 \times 7 \times 16}{2 \times 1 \times 14} + \frac{7 \times 16}{1 \times 16} = 40 //$$

Simplify the following boolean expression.

$$(A + B)(\overline{C} + B)(B + (\overline{B} + \overline{C})) + A + B + C$$

Select one:

- B
- A+B+C
- 1
- A(B+C)
- None of the above

use the calculator


Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (

$$y = \sqrt{x} + 8 \sqrt[3]{x} - 2 \sqrt[4]{x} .$$

$$y' = \boxed{\frac{1}{2}} x^{-\frac{1}{2}} + \boxed{\frac{8}{3}} x^{-\frac{2}{3}} - \boxed{1/2} x^{-\frac{3}{4}}$$

Consider the following linear system of equations.

$$\begin{aligned}x + 2y + z &= 5 \\ -2x + 3y - 3z &= 4 \\ 4y + 2z &= 8\end{aligned}$$

a) Represent the above system of linear equations in matrix form $Ax = b$.

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$$\begin{array}{l} a = 1 \quad b = 2 \quad c = 1 \\ d = -2 \quad e = 3 \quad f = -3 \\ g = 0 \quad h = 4 \quad i = 2 \\ p = 5 \\ q = 4 \\ r = 8 \end{array} \rightarrow$$

$$\begin{bmatrix} 1 & 2 & 1 \\ -2 & 3 & -3 \\ 0 & 4 & 2 \end{bmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 5 \\ 4 \\ 8 \end{pmatrix}$$

$$|A| = 0 + [4 \times (-1)^5 \times -1] + [2 \times (-1)^6 \times 7] = 18$$

b) Find the determinant of A. 18

c) Find x using the cramer's rule.

$$x = \frac{|A_1|}{|A|}, A_1 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$\begin{array}{l} a = 5 \quad b = 2 \quad c = 1 \\ d = 4 \quad e = 3 \quad f = -3 \\ g = 8 \quad h = 4 \quad i = 2 \end{array}$$

$$A_1 = \begin{bmatrix} 5 & 2 & 1 \\ 4 & 3 & -3 \\ 8 & 4 & 2 \end{bmatrix}$$

$$x = \frac{18}{18} = 1 //$$

$$|A_1| = [5 \times (-1)^2 + 18] + [2 \times (-1)^3 \times 32] + [1 \times (-1)^4 \times -8] = 90 - 64 - 8 = 18 //$$

$$|A_1| = 18 //$$

Consider the following function.

$$f(x) = x^4 - x^2 + 20$$

1. Find $f'(-4)$: -248

2. Find the definite integral of $f(x)$ from -3 to 3: $\frac{456}{5}$ (Round your answer to one decimal place)

$$f'(x) = 4x^3 - 2x + 0$$

$$f'(x) = 4x^3 - 2x$$

$$f'(-4) = 4(-4)^3 - 2(-4)$$

$$f'(-4) = (4 \times -64) + 8$$

$$f'(-4) = -248$$

$$\int_{-3}^3 x^4 - x^2 + 20 dx$$

$$\left[\frac{x^5}{5} \right]_{-3}^3 - \left[\frac{x^3}{3} \right]_{-3}^3 + \left[20x \right]_{-3}^3$$

$$\left[\frac{243}{5} + \frac{243}{5} \right] - \left[\frac{27}{3} + \frac{27}{3} \right] + [120]$$

$$\frac{486}{5} - \frac{54}{3} + 120 = \frac{1368}{15} = \frac{456}{5} //$$

Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$f(t) = \frac{4}{t} - \frac{1}{6t^3} + \frac{8}{t^5}$$

$$f'(t) = -4t^{-2} + \frac{3}{6}t^{-4} - 40t^{-6}$$

$$f'(t) = -4t^{-2} + \frac{1}{2}t^{-4} - 40t^{-6} //$$

$$f'(t) = -4t^{-2} + \frac{1}{2}t^{-4} - 40t^{-6} //$$

a) Convert 7452_{10} to following number systems.

Equivalent Binary Number (x) = ✓

Equivalent Octal Number (y) = ✓

Equivalent Hexadecimal Number (z) = ✓

b) Find:
 (Write your answer for 2's complement with 13 digits)

2's Complement of x (x') =

8's Complement of y =

16's Complement of z =

c) Fill in the blanks.

i) $10101010 + 11001100 = \text{101110110}$ (Write your answer with 9 digits)

ii) $11001100 - 10101010 = \text{00100010}$ (Write your answer with 6 digits)

iii) $1001100 \times 1010 = \text{1011111000}$ (Write your answer with 10 digits)

iv) $1001100 \div 101$
 Quotient = (Write your answer with 4 digits)
 Remainder = (Write your answer with 2 digits)

Consider the following function.

$$f(x) = x^5 + 2x^3 - 5$$

$f'(x) = 5x^4 + 6x^2 - 0$

$f'(x) = 5x^4 + 6x^2$

$f'(-2) = [5 \times (-2)^4 + 6 \times (-2)^2]$

$f'(-2) = (5 \times 16) + (6 \times 4)$

$f'(-2) = 160$

1. Find $f'(-2)$:

2. Find the definite integral of $f(x)$ from -2 to 2:

$$\begin{aligned} \int_{-2}^2 x^5 + 2x^3 - 5 &= \left[\frac{x^6}{6} \right]_{-2}^2 + \left[\frac{2x^4}{4} \right]_{-2}^2 - \left[5x^2 \right]_{-2}^2 \\ &= \left[\frac{64}{6} - \frac{64}{6} \right] + \left[8 - 8 \right] - \left[10 + 10 \right] \\ &= -20 // \end{aligned}$$

$$\frac{2+2n}{2} = 4$$

$$1+n = 4$$

$$1 = 4 - n$$

$$1 = -1n + 1 \quad 4 - 1$$

Sum of the two digits of a two-digit number is 15. When the sum of two and twice the tens digit is divided by 2 gives the unit digit. Write down 2 equations to find the unit digit (Y) and tens digit (X).

(Hint: For 34, 3 is the tens digit and 4 is the unit digit)

$$1 * X + 1 * Y = 15$$

$$-1 * X + 1 * Y = 1$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$p = 1 \quad q = 1$$

$$r = -1 \quad s = 1$$

$$c = 15$$

$$d = 1$$

$$\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 15 \\ 1 \end{bmatrix}$$

$$C_{11} = (-1)^1 \times 1 = 1$$

$$C_{12} = (-1)^2 \times -1 = 1$$

$$C_{21} = (-1)^3 \times 1 = -1$$

$$C_{22} = (-1)^4 \times 1 = 1$$

$$C = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$$

b) Find the cofactor matrix(C) of A.

$$C = \begin{bmatrix} a1 & a2 \\ a3 & a4 \end{bmatrix}$$

Green Leaf landscaping company got two orders from a Kindergarten. The first order was for 15 bushes and 8 trees, and the cost was 3850LKR. The second order was for 8 bushes and 5 trees, and the cost was 2200LKR. Write down 2 equations to find the cost of a bush (X) and a tree (Y).

$$15 * X + 8 * Y = 3850$$

$$8 * X + 5 * Y = 2200$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$p = 1 \quad q = 1$$

$$r = 8 \quad s = 5$$

$$c =$$

$$d =$$



Consider the following linear system of equations.
 $x - 2y + z = 0$
 $2x + 3y - 4z = -4$
 $3x - 13y + 4z = -11$

$$\begin{pmatrix} 1 & -2 & 1 & 0 \\ 2 & 3 & -4 & -4 \\ 3 & -13 & 4 & -11 \end{pmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ -4 \\ -11 \end{bmatrix}$$

1. Write down the augmented matrix for the above system of linear equations and reduce that to echelon form.

$$\begin{bmatrix} a & b & c & p \\ d & e & f & q \\ g & h & i & r \end{bmatrix} \rightarrow \begin{bmatrix} a_1 & b_1 & c_1 & p_1 \\ d_1 & e_1 & f_1 & q_1 \\ g_1 & h_1 & i_1 & r_1 \end{bmatrix} \rightarrow \begin{bmatrix} a_2 & b_2 & c_2 & p_2 \\ d_2 & e_2 & f_2 & q_2 \\ g_2 & h_2 & i_2 & r_2 \end{bmatrix} \rightarrow \begin{bmatrix} a_3 & b_3 & c_3 & p_3 \\ d_3 & e_3 & f_3 & q_3 \\ g_3 & h_3 & i_3 & r_3 \end{bmatrix}$$

$$r_2' = r_2 - 2r_1$$

$$r_3' = r_3 - 3r_1$$

$$r_2'' = r_3 + r_2$$

$$a = 1 \quad a_1 = 1 \quad a_2 = 1 \quad a_3 = 1$$

$$b = -2 \quad b_1 = -2 \quad b_2 = -2 \quad b_3 = -2$$

$$c = 1 \quad c_1 = 1 \quad c_2 = 1 \quad c_3 = 1$$

$$d = 2 \quad d_1 = 0 \quad d_2 = 0 \quad d_3 = 0$$

$$e = 3 \quad e_1 = 7 \quad e_2 = 7 \quad e_3 = 7$$

$$f = -4 \quad f_1 = -8 \quad f_2 = -8 \quad f_3 = -8$$

$$g = 3 \quad g_1 = 3 \quad g_2 = 0 \quad g_3 = 0$$

$$h = -13 \quad h_1 = -13 \quad h_2 = -7 \quad h_3 = 0$$

$$i = 4 \quad i_1 = 4 \quad i_2 = 1 \quad i_3 = -7$$

$$p = 0 \quad p_1 = 0 \quad p_2 = 0 \quad p_3 = 0$$

$$r = -4 \quad r_1 = -4 \quad r_2 = -9 \quad r_3 = -4$$

$$\begin{bmatrix} 1 & -2 & 1 & 0 \\ 2 & 3 & -4 & -4 \\ 3 & -13 & 4 & -11 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & -2 & 1 & 0 \\ 0 & 7 & -8 & -4 \\ 3 & -13 & 4 & -11 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & -2 & 1 & 0 \\ 0 & 7 & -8 & -4 \\ 0 & -7 & 1 & -11 \end{bmatrix}$$

↓

$$\begin{bmatrix} 1 & -2 & 1 & 0 \\ 0 & 7 & -8 & -4 \\ 0 & 0 & -7 & -15 \end{bmatrix}$$

Obtain the truth table for the following expression.

$$D = \overline{A} \overline{B} \overline{C} + \overline{A} BC + \overline{A} \overline{B} C$$

A	B	C	$\overline{A} \overline{B} \overline{C}$	$\overline{A} BC$	$\overline{A} \overline{B} C$	D
0	0	0	0	0	0	0
0	0	1	0	0	1	1
0	1	0	1	0	0	1
0	1	1	0	1	0	1
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	0	0	0
1	1	1	0	0	0	0

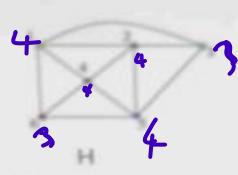
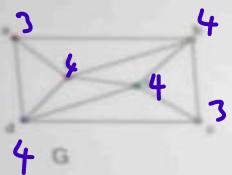
Find the following definite integral.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_1^4 \frac{8}{\sqrt{t}} - 12\sqrt{t^3} dt = \boxed{\quad}$$



Consider the following 2 graphs.



Number of Components

G H

Number of Vertices

G H

Number of Edges

G H

Degree Sequence

G H

Are they isomorphic?

G and H are

- Isomorphic
 Not isomorphic

To buy a computer system, a customer can choose one of 8 monitors, one of 8 keyboards, one of 8 computers and one of 6 printers.

a) Determine the number of possible systems that a customer can choose from.

Answer = :

b) Another customer wants to buy a 2 monitors or 2 keyboards or 3 computers.

Find the possible ways of choosing monitor, keyboard and computer.

Answer = :

Question 13
Not yet answered
Marked out of 10
Flag question

Consider the following linear system of equations

$$\begin{aligned}x - 2y - z &= 4 \\3x - 2y + 3z &= 0 \\2x - 3y + 2z &= 5\end{aligned}$$

(If your answer is not an integer, then write it as a quotient (eg: 2/5))
(Simplify your answer as much as possible. eg: Do not keep 2/6, write 1/3 (No common factor))

a) Write down the above three equations in matrix form $Ax = b$.

$$A = \begin{pmatrix} 1 & -2 & -1 \\ 3 & -2 & 3 \\ 2 & -3 & 2 \end{pmatrix}, \quad b = \begin{pmatrix} 4 \\ 0 \\ 5 \end{pmatrix}$$

b) Consider the following. Find the values of the resulting matrix, when the following elementary operations are performed.

$$\left[\begin{array}{ccccccc} 1 & -2 & -1 & 1 & 0 & 0 \\ 3 & -2 & 3 & 0 & 1 & 0 \\ 2 & -3 & 2 & 0 & 0 & 1 \end{array} \right] \rightarrow \left[\begin{array}{ccccccc} a & b & c & j & k & l \\ d & e & f & m & n & o \\ g & h & i & p & q & r \end{array} \right]$$

$$\begin{aligned}1. r_2' &= r_2 - 3r_1 \\2. r_3' &= r_3 - 2r_1 \\3. r_3' &= r_3 - \frac{1}{4}r_2 \\&\dots\end{aligned}$$

If $|A| = 128$ then find the cofactor matrix of A .

$$A = \begin{bmatrix} x & 5 & 7 \\ 2 & 4 & 1 \\ -2 & 8 & 3 \end{bmatrix}$$

C_{11}	Choose...	<input checked="" type="checkbox"/>
C_{12}	Choose...	
C_{13}	10 24 41 23 14 -14 4 -10 -4 15 -23 40 8 -40 -8 16	
C_{21}		
C_{22}		
C_{23}	Choose...	

N Refers to all the positive integers. (Called as Natural Numbers)

$$f: N \rightarrow N \quad f(n) = n^2$$

Is f a One to one function? ✓

No

Is f an onto function? ✓

No

Does f has an inverse function?

No

$$f(x) = (x^2 - 5)(x^3 - 2x + 3)$$

$$f'(x) = 3x^4 - 2x^3 - 15x^2 + 10 + 2x^4 - 4x^2 + 6x$$

$$f'(x) = 5x^4 - 21x^2 + 6x + 10$$

$$f'(-2) = (5 \times 16) - (21 \times 4) + (6 \times -2) + 10$$

$$f'(-2) = 80 - 84 - 12 + 10$$

$$f'(-2) = -6 //$$

$$f(x) = (x^2 - 5)(x^3 - 2x + 3)$$

Find $f'(-2)$.

Hint : Differentiate the function and Substitute -2.
(No spaces should be in the answer)

Answer: -6

Consider the following function.

$$g: R \rightarrow R \quad g(x) = \frac{(3x - 7)}{2}$$

Find $g^{-1}(4)$

Hint : Find the inverse of g and substitute 4.

Answer: 5

$$y = \frac{(3x - 7)}{2}$$

$$2y = 3x - 7$$

$$3x = 2y + 7$$

$$x = \frac{(2y + 7)}{3}$$

$$g^{-1}(x) = \frac{(2x + 7)}{3}$$

$$g^{-1}(4) = \frac{(8 + 7)}{3} = \frac{15}{3} = 5 //$$

a) Determine whether the following graph has Euler path

Euler Path =

Yes
 No

Euler Circuit =

Yes
 No

Hamilton Path =

Yes
 No

Hamilton Circuit =

Yes
 No

If $|A| = 43$ then find the cofactor matrix of A.

$$A = \begin{bmatrix} 1 & 2 & 7 \\ 4 & -3 & x \\ 2 & 2 & 5 \end{bmatrix}$$

C_{11}

C_{12} ✓

C_{13}

C_{21}

C_{22}

C_{23}

Let $A = \begin{bmatrix} 1 & -5 & 4 \\ 2 & 3 & 1 \\ 3 & 0 & 5 \end{bmatrix}$

and $B=3A$; $C=B+2A-5I$. Find matrix D such that
 Assume I is the identity matrix.

$$D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

a = : 5
 b = : 0
 c = : 0
 d = : 0
 e = : 5
 f = : 0
 g = : 0
 h = : 0
 i = : 5



Sum of the two digits of a two-digit number is 15. When the sum of two and twice the tens digit is divided by 2 gives the unit digit. Write down 2 equations to find the unit digit (Y) and tens digit (X).

(Hint: For 34, 3 is the tens digit and 4 is the unit digit)

$* X + * Y =$
 $* X + * Y = 1$

a) Write the above 2 equations in matrix form $Ax = b$. [According to the given order].

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

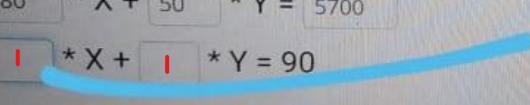
p = : q = :
 r = : s = :



John is running a concession stand at a volleyball game. John is selling Noodle packs and Milo packets. Each Noodle pack costs 80LKR and each Milo packet costs 50LKR. At the end John had a total of 5700LKR. John sold a total of 90 Noodle packs and Milo Packets combined. Write down 2 equations to find, number of Noodle packs(x)and Milo packets (y) sold?

80 * X + 50 * Y = 5700

80 * X + 50 * Y = 90



a) Determine whether the following graph has Euler path, Euler circuit, Hamilton path or Hamilton circuit.

Euler Path = Yes No

Euler Circuit = Yes No

Hamilton Path = Yes No

Hamilton Circuit = Yes

Consider the following function.

$$g: R \rightarrow R \quad g(x) = \frac{(9+x)}{3}$$

Find $g^{-1}(2)$

Hint: Find the inverse of g and substitute 2.

Answer: -3

$y = \frac{(9+x)}{3}$
 $3y = 9 + x$
 $x = 3y - 9$
 $\underline{g^{-1}(x)} = 3x - 9$
 $\underline{g^{-1}(2)} = 6 - 9$
 $= -3 //$

Find the following definite integral.

$$\int_{-1}^0 |3x - 4| dx$$

(Write your answer as a fraction Eg: 3/2, Please remove spaces from the answer)

Answer: 11/2

$\underline{x = 4/3} = 1 \cdot 3$
 $\underline{-1} \quad \underline{0} \quad \underline{4/3}$

$\left[-\frac{3x^2}{2} + 4x \right]_{-1}^0$
 $0 - \left(-\frac{3}{2} - 4 \right)$
 $11/2 //$

a) Determine whether the following graph has Euler path, Euler circuit, Hamilton path or Hamilton circuit.

Euler Path = Yes No

Euler Circuit = Yes No

Hamilton Path = 1 2 5

a) Convert 6728_{10} to following number systems.

Equivalent Binary Number (x) = **1101001001000**

Equivalent Octal Number (y) = **15110**

Equivalent Hexadecimal Number (z) = **1A48**

b) Find:
 (Write your answer for 2's complement with 13 digits)

2's Complement of x (x') = **10110111000**

8's Complement of y = **62670**.

16's Complement of z = **E5B8**.

c) Fill in the blanks.

i) $11011001 + 10101110 = \underline{110000111}$ (Write your answer with 9 digits)

ii) $11011001 - 10101110 = \underline{101011}$ (Write your answer with 6 digits)

iii) $11011101 \times 110 = \underline{10100101110}$ (Write your answer with 11 digits)

iv) $11011101 \div 110$
 Quotient = **100100** (Write your answer with 6 digits)
 Remainder = **101** (Write your answer with 3 digits)

Consider the following finite state Machine A.

What is the initial State? **A**

To what state does A go if abcacbac input to A in sequence starting from the initial state?

① Choose... **D**

② Choose... **C**

③ Choose... **B**

④ Choose... **A**

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Consider the function $f: \mathbb{R} \rightarrow \mathbb{R}$ $f(x) = x^2 - 1$

a) Is this a one-to-one function?

Yes
 No

b) Is this an onto function?

Yes
 No

b) Does the inverse exist?

Yes
 No

b) What is the inverse function?

$f^{-1}(x) = x^2$
 $f^{-1}(x) = 1/x^2$
 $f^{-1}(x) = \sqrt{x} - 1$
 f does not exist

Find the following definite integral.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_{-2}^1 5z^2 - 7z + 3 dz = \boxed{\frac{69}{2}}$$

$$\begin{aligned} & \int_{-2}^1 5z^2 - 7z + 3 dz = \left[\frac{5z^3}{3} \right]_{-2}^1 - \left[\frac{7z^2}{2} \right]_{-2}^1 + \left[3z \right]_{-2}^1 \\ & \left[\frac{5}{3} + \frac{40}{3} \right] - \left[\frac{7}{2} - \frac{28}{2} \right] + [3 + 6] \end{aligned}$$

$$\frac{45}{3} + \frac{21}{2} + 9 = 15 + \frac{21}{2} + 9 = \frac{69}{2} //$$

$$f(x) = (x^2 - 5)(x^3 - 2x + 3)$$

Find $f'(-2)$.

Hint : Differentiate the function and Substitute -2.
(No spaces should be in the answer)

Answer: - 6

N Refers to all the positive integers. (Called as Natural Numbers)

$$f: N \rightarrow N \quad f(n) = n^2 + 3$$

Is f a One to one function? ✓

Choose... ▾

Is f an onto function? ✗

Choose... ▾

Does f has an inverse function? ✗

Choose... ▾

ANSWER

Consider the following linear system of equations.

$$\begin{aligned}x + 2y - z &= 2 \\2x + y + z &= 7 \\3x - y + 2z &= 7\end{aligned}$$

$$\left[\begin{array}{ccc|c} 1 & 2 & -1 & 2 \\ 2 & 1 & 1 & 7 \\ 3 & -1 & 2 & 7 \end{array} \right]$$

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

(Simplify your answer as much as possible. eg: Do not keep 2/6, write 1/3 (No common factors should be there in numerator and denominator))

a) Write down the above three equations in matrix form $Ax = b$.

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

$$b = \begin{bmatrix} 2 \\ 7 \\ 7 \end{bmatrix}$$

b) Consider the following. Find the values of the resulting matrix, when the following elementary row

$$y = \frac{9+x}{3}$$

$$3y = 9 + x$$

$$x = 3y - 9$$

$$g^{-1}(x) = 3x - 9$$

$$g^{-1}(2) = 6 - 9 \\ = -3 //$$

Consider the following function.

$$g: R \rightarrow R \quad g(x) = \frac{(9+x)}{3}$$

Find $g^{-1}(2)$

Hint : Find the inverse of g and substitute 2.

Answer : -3

To buy a computer system, a customer can choose one of 4 monitors, one of 6 keyboards, one of 3 computers and one of 6 printers.

a) Determine the number of possible systems that a customer can choose from.

Answer = 432

b) Another customer wants to buy a monitor, keyboard and computer only.

Find the possible ways of choosing monitor, keyboard and computer.

Answer = 13

$$4C_1 + 6C_1 + 3C_1$$

$$\frac{4}{1 \times 1} + \frac{6}{1 \times 1 \times 1} + \frac{3}{1 \times 1 \times 1} = 4 + 6 + 3 = \underline{\underline{13}}$$

Consider the following function.

$$f(x) = x^4 - x^2 + 20$$

1. Find $f'(-4)$: -248

2. Find the definite integral of $f(x)$ from -3 to 3 : 91.2

(Round your answer to one decimal place)

Christy is selling tickets for an exhibition. On the first day of the exhibition 35 adult tickets and 30 child tickets were sold for a total of 2350LKR. On the second day Christy got a revenue of 3300LKR by selling 50 adult tickets and 40 child tickets. Find the price of an adult ticket(X) and the price of a child ticket(Y).

$$35 \cdot X + 30 \cdot Y = 2350$$

$$50 \cdot X + 40 \cdot Y = 3300$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} p & q \\ r & s \end{bmatrix} \quad x = \begin{bmatrix} t \\ u \end{bmatrix} \quad b = \begin{bmatrix} c \\ d \end{bmatrix}$$

$$p = 35 \quad q = 30$$

$$r = 50 \quad s = 40$$

$$c = 2350$$

$$d = 3300$$

$$\begin{bmatrix} 35 & 30 \\ 50 & 40 \end{bmatrix} \begin{bmatrix} t \\ u \end{bmatrix} = \begin{bmatrix} 2350 \\ 3300 \end{bmatrix}$$

$$C = \begin{bmatrix} 40 & -50 \\ -20 & 35 \end{bmatrix}$$

$$C_{11} = (-1)^1 \times 40 = 40$$

$$C_{12} = (-1)^2 \times 50 = -50$$

$$C_{21} = (-1)^3 \times 30 = -30$$

$$C_{22} = (-1)^4 \times 35 = 35$$

b) Find the cofactor matrix(C) of A.

$$C = \begin{bmatrix} a1 & a2 \\ a3 & a4 \end{bmatrix}$$

$$a1 = 40 \quad a2 = -50$$

$$a3 = -30 \quad a4 = 35$$

$$f(x) = (x^2 - 5)(x^3 - 2x + 3)$$

Find $f'(-2)$.

Hint : Differentiate the function and Substitute -2.

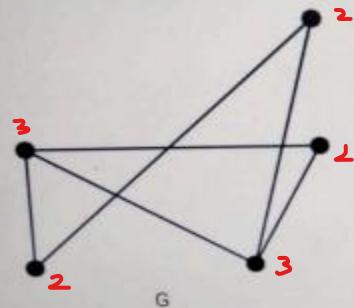
(No spaces should be in the answer)



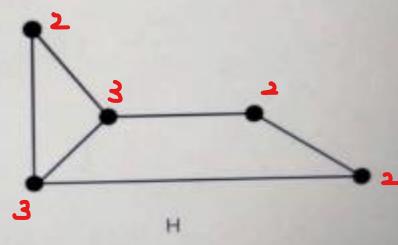
Answer: -6



Consider the following 2 graphs.



G



H

Number of Components

G
1

H
1

Number of Vertices

G
5

H
5

Number of Edges

G
6

H
6

Degree Sequence

G
3 3 2 2 2

H
3 3 2 2 2

Are they isomorphic?

G and H are

isomorphic

Isomorphic

Let $A = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix}$

Find $B = A^2 - 3A + 2I$

$B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

a = 18

b = -12

c = -9

d = 12

$$B = \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix} - \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 18 & -12 \\ -9 & 12 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} -1 & 4 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 13 & 0 \\ 0 & 13 \end{bmatrix}$$

$$3A = \begin{bmatrix} -3 & 12 \\ 9 & 3 \end{bmatrix}$$

$$2I = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

N Refers to all the positive integers. (Called as Natural Numbers)

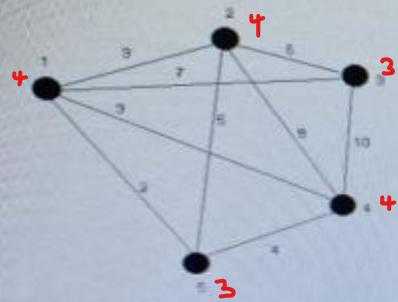
$$f: N \rightarrow N \quad f(n) = x^3 - 2x + 1$$

Is f a One to one function? Choose... ▾

Is f an onto function? Choose... ▾

Does f has an inverse function? Choose... ▾

a) Determine whether the following graph has Euler path, Euler circuit, Hamilton path or Hamilton circuit.



Euler Path =

Yes

No

Euler Circuit =

Yes

No

Hamilton Path =

Yes

No

Hamilton Circuit = Yes

If $|A| = 128$ then find the cofactor matrix of A.

$$A = \begin{bmatrix} x & 5 & 7 \\ 2 & 4 & 1 \\ -2 & 8 & 3 \end{bmatrix}$$

C_{11} Choose... ✓

C_{12} Choose... ✓



C_{13} Choose... ✓

C_{21} Choose... ✓

C_{22} Choose... ✓

N Refers to all the positive integers. (Called as Natural Numbers)

$$f: N \rightarrow N \quad f(n) = x^3 - 2x + 1$$

Is f a One to one function? ✗

Choose... ✓



Is f an onto function? ✗

Choose... ✓

Does f has an inverse function? ✗ Choose... ✓

Find the following definite integral.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_{-2}^1 5z^2 - 7z + 3 \, dz = \frac{69}{2}$$



Find the derivative of the following function.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$f(y) = \frac{y^5 - 5y^3 + 2y}{y^3}$$

$$\begin{aligned}f(y) &= y^2 - 5 + 2y^{-2} \\f'(y) &= 2y - 0 - 2 \times 2 \times y^{-3} \\f'(y) &= 2y - 4y^{-3}\end{aligned}$$

$$f'(y) = 2 y - 4 y^{-3}$$

Let $A = \begin{bmatrix} 2 & 1 & 7 \\ 0 & -3 & 2 \\ 2 & 1 & 3 \end{bmatrix}$

and $B=3A$; $C=B+2A-5I$. Find matrix D such that $D=2A+B-C$.

Assume I is the identity matrix.

$$D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

a = :
b = :
c = :
d = :
e = :
f = :
g = :
h = :
i = :



$$f(t) = 4t^{-1} - \frac{1}{6}t^{-3} + 8t^{-5}$$

$$f'(t) = -4t^{-2} + \frac{1}{2}t^{-4} - 40t^{-6}$$

Find the derivative of the following function.
(If your answer is not an integer, then write it as a quotient (eg.

$$f(t) = \frac{4}{t} - \frac{1}{6t^3} + \frac{8}{t^5}$$

$$f'(t) = -4t^{-2} + \frac{1}{2}t^{-4} - 40t^{-6}$$

Consider the following linear system of equations.

$$\begin{aligned} 2x + y - z &= 6 \\ 3x - 2y + 3z &= 3 \\ x + y + 2z &= -3 \end{aligned}$$

a) Represent the above system of linear equations in matrix form $Ax = b$.

$$A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, b = \begin{bmatrix} p \\ q \\ r \end{bmatrix}$$

$$a = 2, b = 1, c = -1$$

$$d = 3, e = -2, f = 3$$

$$g = -1, h = 1, i = 2$$

$$p = 6, q = 3, r = -3$$

$$x = 2, y = -1, z = 3$$

$$t = -3$$

b) Find the determinant of A

c) Find x using the cramer's rule.

$$x = \frac{|A_1|}{|A|}, A_1 = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$a = 2, b = 1, c = -1$$

$$d = 3, e = -2, f = 3$$

$$g = -1, h = 1, i = 2$$

$$\begin{bmatrix} 2 & 1 & -1 \\ 3 & -2 & 3 \\ -1 & 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 3 \\ -3 \end{bmatrix}$$

$$|A| = 2 \times (-1)^2 \times -1 + 1 \times (-1)^3 \times 3 + (-1 \times (-1)^4 \times 1)$$

$$|A| = -2 - 3 - 1 = -6 //$$

$$|A_1| = 6 \times (-1)^2 \times -1 + 1 \times (-1)^3 \times -3 + (-1 \times (-1)^4 \times 3)$$

$$|A_1| = -6 + 3 + 3$$

$$|A_1| = 0 //$$

$$x = \frac{|A_1|}{|A|} = \frac{0}{-6} = 0 //$$

If $|A| = 43$ then find the cofactor matrix of A.

$$A = \begin{bmatrix} 1 & 2 & 7 \\ 4 & -3 & x \\ 2 & 2 & 5 \end{bmatrix}$$

C_{11} Choose... ✓

C_{12} Choose... ✓



C_{13} Choose... ✓

C_{21} Choose... ✓

✓

C_{22} Choose... ✓

C_{23} Choose... ✓

✓

✓

✓

C_{31} Choose... ✓

C_{32} Choose... ✓

John is running a concession stand at a volleyball game. John is selling Noodle packs and Milo packets. Each Noodle pack costs 80LKR and each Milo packet costs 50LKR. At the end John had a total of 5700LKR. John sold a total of 90 Noodle packs and Milo Packets combined. Write down 2 equations to find, number of Noodle packs (x) and Milo packets (y) sold?

$$80x + 50y = 5700$$

$$1x + 1y = 90$$

a) Write the above 2 equations in matrix form $Ax = b$. (According to the given order).

$$Ax = b$$

$$A = \begin{bmatrix} 80 & 50 \\ 1 & 1 \end{bmatrix}, x = \begin{bmatrix} x \\ y \end{bmatrix}, b = \begin{bmatrix} 5700 \\ 90 \end{bmatrix}$$

$$p = 80, q = 50$$

$$r = 1, s = 1$$

$$c = 5700$$

$$d = 90$$

$$\begin{bmatrix} 80 & 50 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5700 \\ 90 \end{bmatrix}$$

$$C_{11} = (-1)^{1+1} \times 1 = 1$$

$$C_{12} = (-1)^{1+2} \times 1 = -1$$

$$C_{21} = (-1)^{2+1} \times 50 = -50$$

$$C_{22} = (-1)^{2+2} \times 80 = 80$$

b) Find the cofactor matrix(C) of A.

$$C = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

$$a_{11} = 1, a_{12} = -1$$

$$a_{21} = -50, a_{22} = 80$$

$$C = \begin{bmatrix} 1 & -1 \\ -50 & 80 \end{bmatrix}$$

Consider the following 2 graphs.

G

H

	G	H
Number of Components	1	1
Number of Vertices	6	6
Number of Edges	11	11
Degree Sequence	4, 4, 4, 4, 3, 3	4, 4, 4, 4, 3, 3

Are they isomorphic?

G and H are

isomorphic Not isomorphic

Consider the following 2 graphs.

G

H

	G	H
Number of Components	1	1
Number of Vertices	8	8
Number of Edges	12	12
Degree Sequence	3, 3, 3, 3, 3, 3, 3, 3	3, 3, 3, 3, 3, 3, 3, 3

Are they isomorphic?

G and H are

isomorphic Not isomorphic

Find the following definite integral.

(If your answer is not an integer, then write it as a quotient (eg: 2/5))

$$\int_1^6 12x^3 - 9x^2 + 2 dx = \boxed{3250}$$

$$\left[\frac{12x^4}{4} \right]_1^6 - \left[\frac{9x^3}{3} \right]_1^6 + \left[2x \right]_1^6$$

$$\left[(3 \cdot 1296 - 3) \right] - \left[(4 \cdot 216) - 3 \right] + \left[12 - 2 \right]$$

$$3885 - 645 + 10 \\ 3250 //$$

a) Determine whether the following graph has

Euler Path = Yes No

Euler Circuit = Yes No

Hamilton Path = Yes No

Hamilton Circuit = Yes No

b) Write down the adjacency matrix for the above graph.

Adjacency matrix =

$$\begin{matrix} & a & b & c & d \\ a & 0 & 1 & 1 & 1 \\ b & 1 & 0 & 1 & 1 \\ c & 1 & 1 & 0 & 1 \\ d & 1 & 1 & 1 & 0 \end{matrix}$$

Consider the following function.

$$g: R \rightarrow R \quad g(x) = \frac{(12 - 3x)}{4}$$

$$y = \frac{(12 - 3x)}{4}$$

$$4y = 12 - 3x$$

$$3x = 12 - 4y$$

$$x = \frac{12 - 4y}{3}$$

Find $g^{-1}(-3)$

Hint : Find the inverse of g and substitute -3.

Answer:

$$g^{-1}(x) = \frac{(12 - 4x)}{3}$$

$$g^{-1}(-3) = \frac{(12 - 4 \cdot (-3))}{3}$$

$$g^{-1}(-3) = \frac{12 + 12}{3} = \frac{24}{3} = 8 //$$

$$A^2 = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} \times \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$

$$3A = \begin{bmatrix} -3 & 6 \\ 9 & 3 \end{bmatrix}$$

$$2I = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

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

Find $B = A^2 - 3A + 2I$

$$B = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

a = : 12

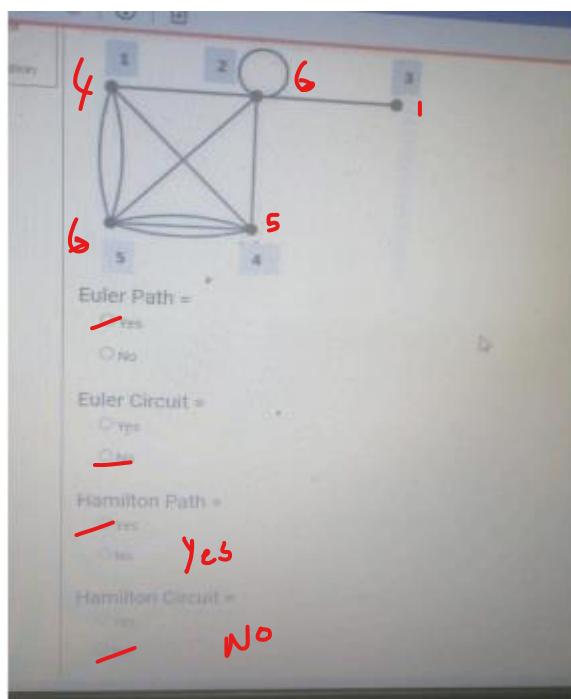
b = : -6

c = : -9

d = : 6

$$B = \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix} - \begin{bmatrix} -3 & 6 \\ 9 & 3 \end{bmatrix} + \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$B = \begin{bmatrix} 12 & -6 \\ -9 & 6 \end{bmatrix}$$



$$y = \frac{3x - 7}{2}$$

$$2y = 3x - 7$$

$$3x = 2y + 7$$

$$x = \frac{2y + 7}{3}$$

$$g^{-1}(x) = \frac{2x + 7}{3}$$

$$g^{-1}(4) = \frac{2 \times 4 + 7}{3}$$

$$= \frac{15}{3} = 5 //$$

Consider the following function.

$g: R \rightarrow R \quad g(x) = \frac{(3x - 7)}{2}$

Find $g^{-1}(4)$

Hint: Find the inverse of g and substitute 4.

Answer: 5

N Refers to all the positive integers. (Called as Natural Numbers)

$f: N \rightarrow N \quad f(n) = n^3 - 3$

Is f a One to one function? ✓ Choose... ▾

Is f an onto function? ✗ Choose... ▾

Does f has an inverse function? ✗ Choose... ▾

Consider the following function.

$f(x) = x^3 - 2x^2 + 5$

1. Find $f'(-3)$: 39

2. Find the definite integral of $f(x)$ from -3 to 3: -6

$$f'(x) = 3x^2 - (2x \cdot 2x) + 0$$

$$f'(x) = 3x^2 - 4x$$

$$f'(-3) = 3 \times (-3)^2 - (4 \times (-3))$$

$$f'(-3) = 27 + 12$$

$$f'(-3) = 39 //$$

$$\int_{-3}^3 x^3 - 2x^2 + 5 = \left[\frac{x^4}{4} \right]_{-3}^3 - \left[\frac{2x^3}{3} \right]_{-3}^3 + \left[5x \right]_{-3}^3$$

$$= \left[\frac{81}{4} - \frac{81}{4} \right] - \left[\frac{54}{3} + \frac{54}{3} \right] + \left[15 + 15 \right]$$

$$= 0 - \frac{108}{3} + 30$$

$$= -36 + 30 = -6 //$$