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NetExam

Sri Lanka Institute of Information Technology

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Flag question

Find the following definite integral.

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

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

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

$$\int_0^3 -15w^4 + \int_0^3 13w^2 - \int_0^3 w^1\,dw$$

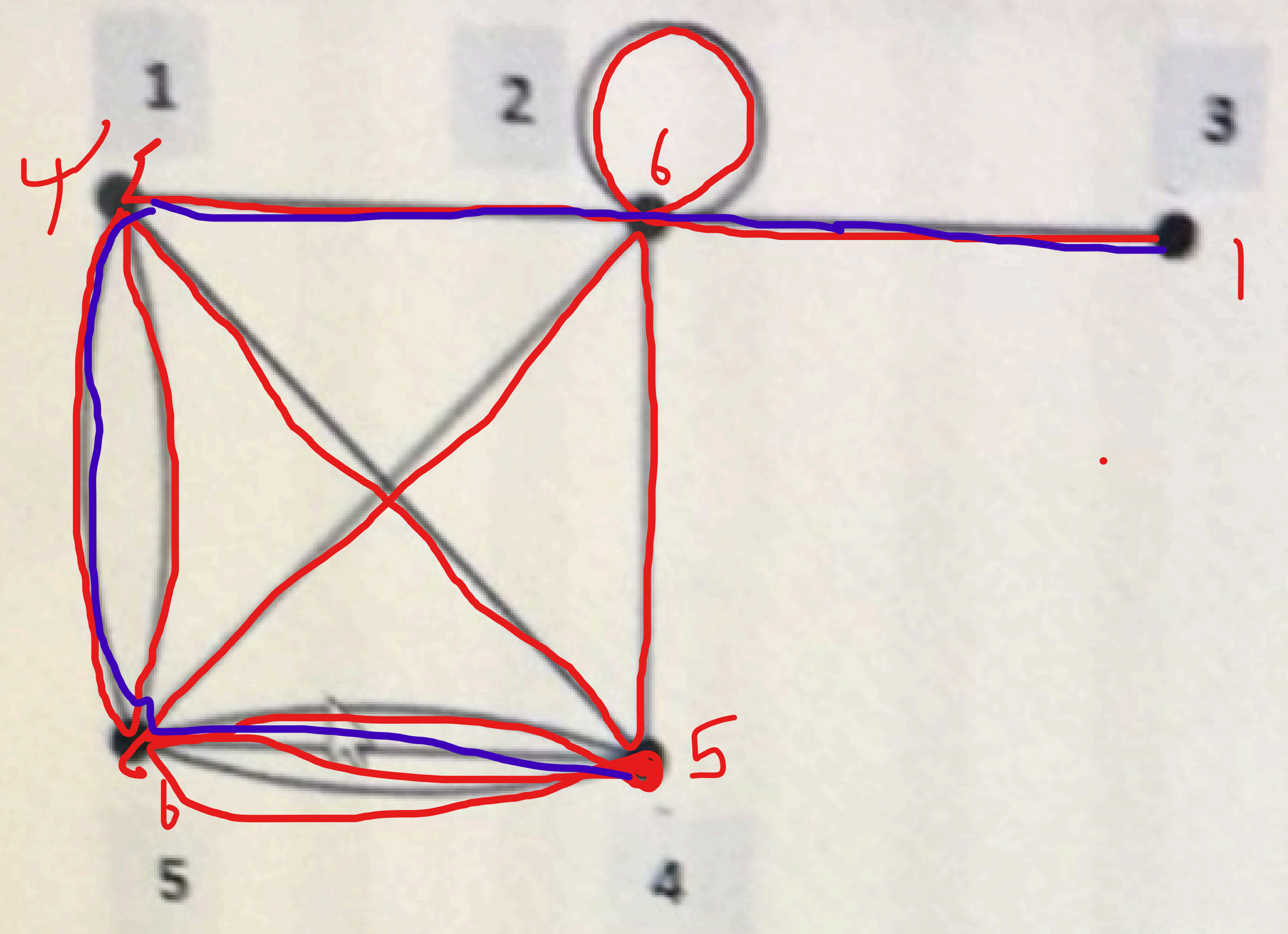
$$-\cancel{15}^{3}\left(\frac{w^5}{\cancel{5}}\right)_0^3 + 13\left[\frac{w^3}{3}\right]_0^3 - \left[\frac{w^2}{2}\right]_0^3$$

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

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

$$-729 + 117 - \frac{9}{2} = -612 - \frac{9}{2} \quad \frac{-1233}{2}$$

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



Euler Path =

- ○ Yes ✓
- ◉ No

Euler Circuit =

- ○ Yes
- ◉ No ✓

Hamilton Path =

- ◉ Yes ✓
- ○ No

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

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

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

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

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

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

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

Question 17

Not yet answered

Marked out of 1.00

Flag question

Consider the following linear system of equations.

$2x + y - 3z = 1$

$3y - 2z = -1$

$3x + y - z = 8$

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

$-1 + + 6$

$= 6$ //

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

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

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

a =: 2 b =: 1 c =: -3

d =: 0 e =: 3 f =: -2

g =: 3 h =: 1 i =: -1

p =: 1

q =: -1

r =: 8

$$\begin{array}{c} \\ A = \end{array} \begin{array}{ccc} C_{11} & C_{12} & C_{13} \\ M_{11} & M_{12} & M_{13} \\ \end{array}$$

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

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

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

$= -2 + -6 + 27$

$= 19$ //

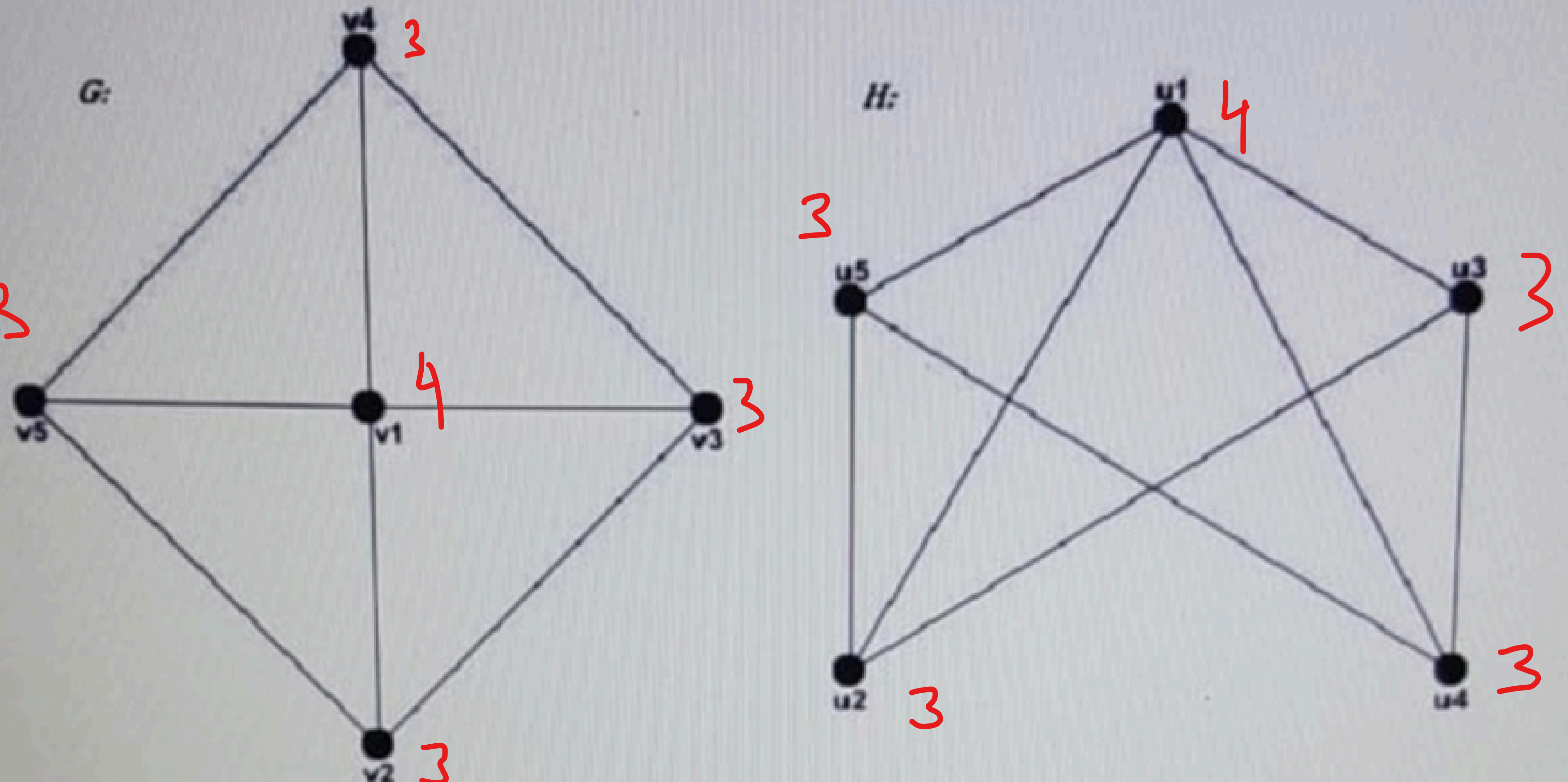
b) Find the determinant of A. : 19

c) Find x using the cramer's rule

$57/19 = 3$

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

Consider the following 2 graphs.



	G		H
Number of Components	1	1	
Number of Vertices	5	5	
Number of Edges	8	8	
Degree Sequence	4 , 3 , 3 , 3		4 , 3 , 3 , 3

Are they isomorphic?

G and H are

○ isomorphic

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

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

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 8, 6, 6, 4, 2, 2, 2, 2.

Does this graph exist?

- ○ Yes ✓
- ○ No

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

Find the derivative of the following function.

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

$\frac{1}{4} - 1$

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

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

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

y' = 1/2 x^(-1/2) + 8/3 x^(-2/3) - 1/2 x^(-3/4)

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

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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

$$8C_1 \times 8C_1 \times 9C_1 \times 6C_1$$

$$= \frac{\lfloor 8}{\lfloor 1 \times \lfloor 7} \times \frac{\lfloor 8}{\lfloor 1 \times \lfloor 7} \times \frac{\lfloor 9}{\lfloor 1 \times \lfloor 8} \times \frac{\lfloor 6}{\lfloor 1 \times \lfloor 5}$$

$$= \frac{8 \times \cancel{\lfloor 7}}{1 \times \cancel{\lfloor 7}} \times \frac{8 \times \cancel{\lfloor 7}}{1 \times \cancel{\lfloor 7}} \times \frac{9 \times \cancel{\lfloor 8}}{1 \times \cancel{\lfloor 8}} \times \frac{6 \times \cancel{\lfloor 5}}{1 \times \cancel{\lfloor 5}}$$

$$= 8 \times 8 \times 9 \times 6$$

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

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

$$\frac{\lfloor 8}{\lfloor 2 \times \lfloor 6} + \frac{\lfloor 8}{\lfloor 2 \times \lfloor 6} + \frac{\lfloor 9}{\lfloor 3 \times \lfloor 6}$$

$$\frac{\overset{4}{\cancel{8}} \times 7 \times \cancel{\lfloor 6}}{\cancel{2} \times 1 \times \cancel{\lfloor 6}} + \frac{\overset{4}{\cancel{8}} \times 7 \times \cancel{\lfloor 6}}{2 \times 1 \times \cancel{\lfloor 6}} + \frac{\overset{3}{\cancel{9}} \times \overset{4}{\cancel{8}} \times 7 \times \cancel{\lfloor 6}}{\cancel{3} \times \cancel{2} \times 1 \times \cancel{\lfloor 6}}$$

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

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

Finish attempt ...

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).

35 * X + 30 * Y = 3000

50 * X + 40 * Y = 4200

$35x + 30y = 3000$ — (1)

$50x + 40y = 4200$ — (2)

(1) × 4 (2) × 3

$140x + 120y = 12000$ — (3)

$150x + 120y = 12600$ — (4)

(4) − (3)

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

$10x = 600$

$x = 60$

$50 \times 60 + 40y = 4200$

$3000 + 40y = 4200$

$40y = 1200$

$y = 30$ //

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 q =: 30

r =: 50 s =: 40

c =: 3000

d =: 4200

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

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

a = : 2 b = : 3 c = : -1

d = : 3 e = : -1 f = : 2

g = : 1 h = : 2 i = : 3

p = : 1

q = : 1

r = : 12

$$\begin{bmatrix} 2 & 3 & -1 \\ 3 & -1 & 2 \\ 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 12 \end{bmatrix}$$

$$|A| = (2 \times -7) - (3 \times 7) + (-1 \times 7)$$
$$= -14 - 21 - 7$$
$$= -42 //$$

$$A_1 = \begin{bmatrix} 1 & 3 & -1 \\ 1 & -1 & 2 \\ 12 & 2 & 3 \end{bmatrix}$$

$$|A_1| = 42$$

b) Find the determinant of A :

c) Find x using the cramer's rule

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

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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)

$f'(x) = 4x^3 - 2x^1 + 0$

$= 4x^3 - 2x$

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

$= -256 - (-8)$

$= -256 + 8$

$= -248$ //

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

$= \frac{486}{5} + 102$

$= \frac{996}{5}$ //

$\int_{-3}^{3} x^4 - x^2 + 20 = \left[\frac{x^5}{5}\right]_{-3}^{3} - \left[\frac{x^3}{3}\right]_{-3}^{3} + \left[20x\right]_{-3}^{3}$

$= \left[\frac{243}{5} - \left(\frac{-243}{5}\right)\right] - \left[\frac{27}{3} + \frac{27}{3}\right] + \left[60 + 60\right]$

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Question 13

Not yet answered

Marked out of 1.00

Flag question

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

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

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

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

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

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

a = : 18

b = : -12

c = : -9

d = : 12

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

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

Question 13
Not yet answered
Marked out of 1.00
Flag question

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

$D = 2A + B - C$

$D = \cancel{2A} + \cancel{B} - (\cancel{B} + \cancel{2A} - 5I)$

$D = 5I$

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

Assume I is the identity matrix.

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

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

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

a =: 5

b =: 0

c =: 0

d =: 0

e =: 5

f =: 0

g =: 0

h =: 0

i =: 5

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Question 20

Not yet answered

Marked out of 1.00

Flag question

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

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

$f(x) = x + 3$

$f(x_1) = x_1 + 3$ — ①

$f(x_2) = x_2 + 3$ — ②

① = ②

$x_1 + \cancel{3} = x_2 + \cancel{3}$

$x_1 = x_2 \to$ 1 to 1 function

$y = f(n)$

$y = n + 3$

$n = y - 3$

$\notin N$

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. ∴ This is not an Inverse Function.

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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 factor
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
order.

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

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

1. $r_2' = r_2 - 3r_1$ ✓
2. $r_3' = r_3 + 2r_1$ ✓
3. $r_3' = r_3 + r_2$
4. $r_3' = r_3 \times -\frac{1}{2}$

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

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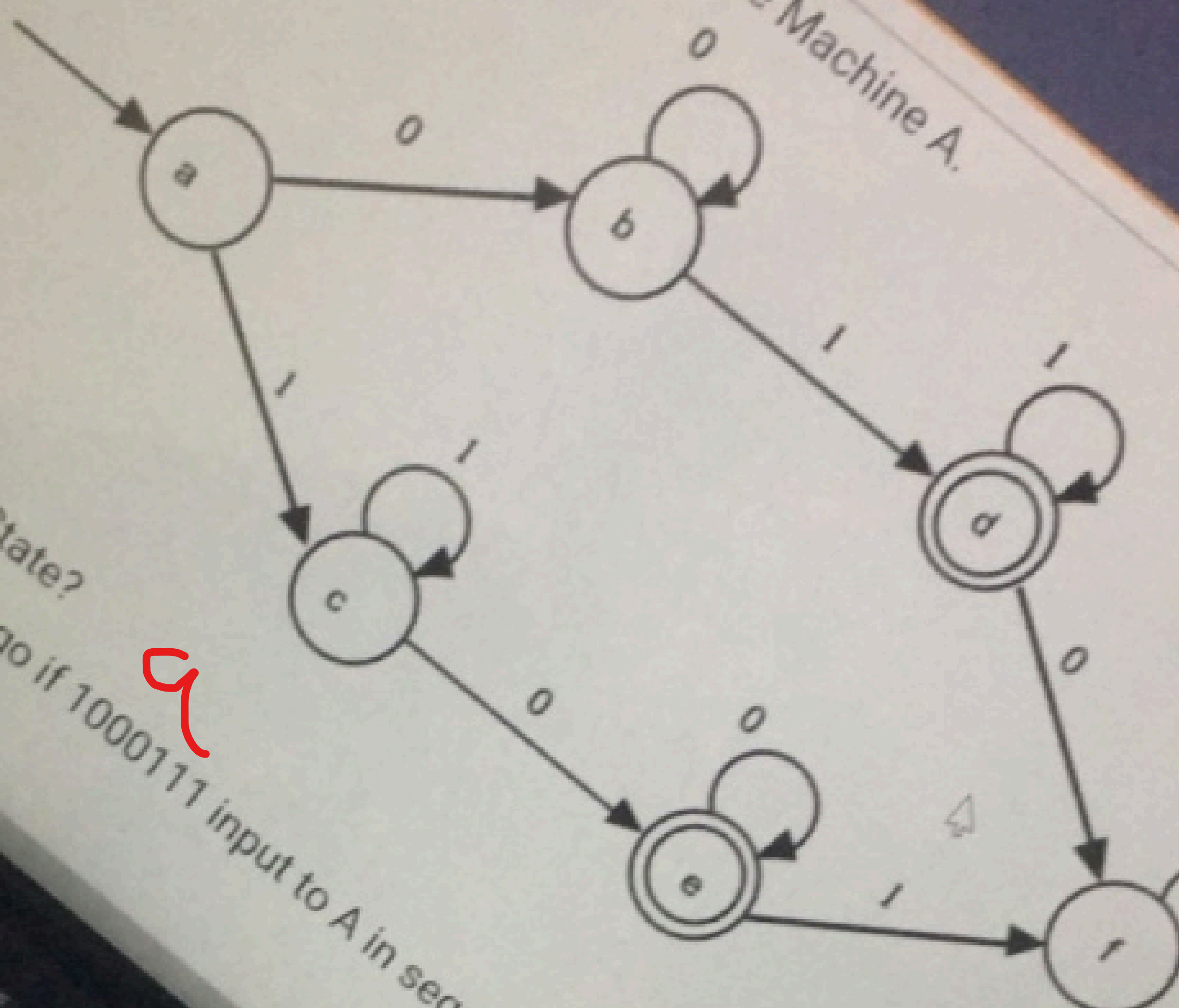
...der the following finite state Machine A.



What is the initial State? Choose...

To what state does A go if 1000111 input to A in sequence starting from the initial state? d a Choose...

...d N(d, 1) f Choose...

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Marked out of 1.00

Flag question

Consider the following linear system of equations.

$x + 2y - z = 1$

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

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

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

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

$$\begin{bmatrix} a & b & c & p \\ d & e & f & q \\ g & h & i & r \end{bmatrix} \quad \begin{bmatrix} a1 & b1 & c1 & p1 \\ d1 & e1 & f1 & q1 \\ g1 & h1 & i1 & r1 \end{bmatrix} \quad \begin{bmatrix} a2 & b2 & c2 & p2 \\ d2 & e2 & f2 & q2 \\ g2 & h2 & i2 & r2 \end{bmatrix} \quad \begin{bmatrix} a3 & b3 & c3 & p3 \\ d3 & e3 & f3 & q3 \\ g3 & h3 & i3 & r3 \end{bmatrix}$$

$p \to 1,\ q \to -4,\ r \to 3$; $g, h, i \to -2, 1, 2$

$p1 \to 1,\ q1 \to -3,\ r1 \to 3$; $g1, h1, i1 \to -2, 1, 2$

$p2 \to 1,\ q2 \to -3,\ r2 \to 5$; $g2, h2, i2 \to 0, 5, 0$

$p3 \to 1,\ q3 \to -3,\ r3 \to 8$; $g3, h3, i3 \to 0, 0, 2$

$r_2' = r_2 + r_1$ $\qquad$ $r_3' = r_3 + 2r_1$ $\qquad$ $r_3' = r_3 - r_2$

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

$$\begin{bmatrix} 1 & 2 & -1 & 1 \\ 0 & 5 & -2 & -3 \\ 0 & 0 & 2 & 8 \end{bmatrix}$$

a =: 1 $\quad$ a1 =: 1 $\quad$ a2 =: 1 $\quad$ a3 =: 1

b =: 2 $\quad$ b1 =: 2 $\quad$ b2 =: 2 $\quad$ b3 =: 2

c =: -1 $\quad$ c1 =: -1 $\quad$ c2 =: -1 $\quad$ c3 =: -1

d =: -1 $\quad$ d1 =: 0 $\quad$ d2 =: 0 $\quad$ d3 =: 0

e =: 3 $\quad$ e1 =: 5 $\quad$ e2 =: 5 $\quad$ e3 =: 5

f =: -1 $\quad$ f1 =: -2 $\quad$ f2 =: -2 $\quad$ f3 =: -2

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

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

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 = $\frac{\text{Total degree}}{2}$

Does it has an Euler path?

- Yes
- No ✓

Does it has an Euler circuit? NO

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Question 1

Not yet answered

Marked out of 1.00

Flag question

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

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

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

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

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

$= 39$

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

$\left(\frac{81}{4} - 18 + 15\right) - \left(\frac{81}{4} + 18 - 15\right)$

$-3 - 3 = -6$

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Consider the following function.

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

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

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

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

$= -256 + 8$

$= -248$

1. Find f '(-4) : $\cancel{-248}$ 248

2. Find the definite integral of f(x) from -3 to 3 : 199 199.2

(Round your answer to one decimal place)

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stion

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.

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

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

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ion

Green Leaf landscaping company got two orders from a Kinder
for 15 bushes and 8 trees, and the cost was 3850LKR. The seco
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. (Accordin

$$Ax = b$$

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

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

p =: 15 q =: 8

r =: 8 s =: 5

c =: ~~2350~~ 3850

d =: ~~3300~~ 2200

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answered

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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 x^(-2/5) - 7/2 x^(5/2) + 16 x^(5/3)

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

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

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

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

b) Consider the following. Find the values of the res
elementary row operations are applied in the given o

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

1. $r_2' = r_2 + 2r_1$
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. $r_1' = r_1 - 3r_3$

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

$$\downarrow$$

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

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

$$\downarrow$$

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

$$\downarrow$$

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

$\downarrow$ p $\quad\downarrow$ q $\quad\downarrow$ r

a = 1 b = -2 c = 0

d = 0 e = 1 f = 0

g = 0 h = 0 i = 1

j = 5/2 k = -3/2 l = -3/2

m = -4/3 n = 1/3 o = 2/3

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

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

$|A| = 1 \times (-15 - 2x) - 2 \times (20 - 2x) + 7(8 + 6)$

$43 = -15 - 2x - 40 + 4x + 56 + 42$

$43 = 43 + 2x$

$2x = 0$

$x = 0$

$C_{11} = (-1)^2 \times -15 = -15$

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

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

$C_{21} = (-1)^3 \times -4 = 4$

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

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

C_{11} Choose...

Choose...
20
-20
-11
15
21
2
3
14
13
28
-4
9
-15
11
4
-9
-14
-21

C_{12}

C_{13}

C_{21}

C_{22}

C_{23} Choose...

Consider the following function.

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

$f'(x) = 5x^4 + 2 \times 3x^2 - 0$

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

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

$= 80 + 24$

$= 104$ //

1. Find f ' (-2) : 104

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

$$\int_{-2}^{2} x^5 + 2x^3 - 5 = \left[\frac{x^6}{6} + \frac{2x^4}{4} - \frac{5x}{1}\right]_{-2}^{2}$$

$$\left[\cancel{\frac{64}{6}} + \cancel{8} - 10\right] - \left[\cancel{\frac{64}{6}} + \cancel{8} + 10\right] = -20$$

a3 = : -1 a4 = : 1

c) Find the determinant of A. : 2

d) Find the adjoint of A.

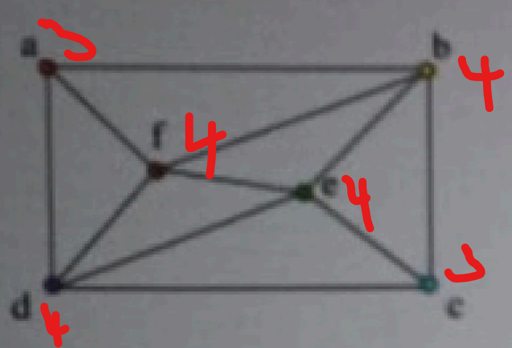
$$adj\ A = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$$

p = : 0.5 q = : -0.5

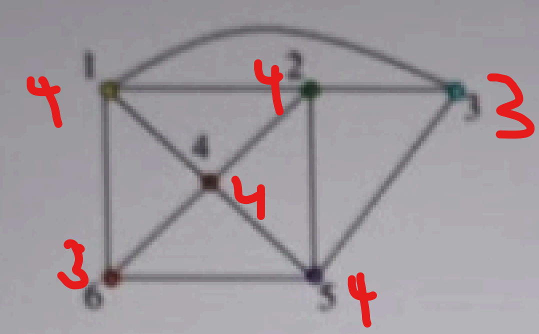
r = : 0.5 s = : 0.5

d) Find the two-digit number. : 78

Consider the following 2 graphs.



G



H

	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

Next page

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 b =: 2 c =: 1

d =: 4 e =: 3 f =: -3

g =: 8 h =: 4 i =: 2

|A1| =: 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 b =: 5 c =: 1

d =: -2 e =: 4 f =: 3

g =: 0 h =: 8 i =: 2

|A2| =: [illegible]

NetExam

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

$f'(x) = (x^2-5)(3x^2-2)$
$+ (2x)(x^3-2x+3)$
$f'(x) = (-1 \times 10) + (-4 \times -1)$
$= -10 + 4$
$= -6$ //

Find f ' (-2).

Hint : Differentiate the function and Substitute -2.

(No spaces should be in the answer)

Answer: -6

NetExam

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on 19

et answered

ed out of

ag question

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

Natural number (+)

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

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

Choose...

No

Yes

Is f an onto function? ✗

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

$f x_1 = x_1^2 - 3$ — 1

$f x_2 = x_2^2 - 3$ — 2

1 = 2

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

$x_1^2 - x_2^2 = 0$

$x_1^2 = x_2^2$

$y = f(n)$

$y = x^2 - 3$

$x^2 = y + 3$

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

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on 16

t answered

d 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' = 1/2 x^(-1/2) + 8/3 x^(-2/3) - 1/2 x^(-3/4)

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

$$y' = \frac{1}{2} \times x^{-1/2} + \frac{8}{3} \times x^{-2/3} - \frac{\cancel{2}}{\cancel{4}\,2}(x)^{-3/4}$$

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

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

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

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 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

$i = 5$

$D = 2A + B - C$

$D = 2\cancel{A} + \cancel{B} - (\cancel{B} + 2\cancel{A} - 5I)$

$D = 5I$

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

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

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

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

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

$$Ax=b$$

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

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

p = 15 q = 8

r = 8 s = 5

c = 3850

d = 2200

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

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

d =

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

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

a1 = 5 a2 = -8

a3 = -8 a4 = 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

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

$|A|=75-64$

$|A|=11$ //

d) Find the adjoint of A.

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

p = 5 q = -8

r = -8 s = 15

Adjoint of A $=\begin{bmatrix} 5 & -8 \\ -8 & 15 \end{bmatrix}$

d) Find the two-digit number. : 15

Consider the following function.

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

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

Hint : Find the inverse of g and substitute 5.

Answer: 5

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

$2y = 5x - 15$

$5x = 2y + 15$

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

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

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

a) Obtain the truth table for the following expression.

D = $ABC + A\overline{B}\,\overline{C} + \overline{A}\,\overline{B}\,\overline{C}$

A	B	C	ABC	$A\overline{B}\,\overline{C}$	$\overline{A}\,\overline{B}\,\overline{C}$	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

$\overline{A}\,B\overline{C} + \overline{A}\,BC + \overline{A}\,\overline{B}\,C$

$= \overline{A}B(\overline{C} + C) + \overline{A}\overline{B}C$ 7

$= \overline{A}B.1 + \overline{A}\overline{B}C$ 10

$= \overline{A}B + \overline{A}\overline{B}C$ 3

$= \overline{A}(B + \overline{B}C)$ 7

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

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

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

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

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

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

Find the derivative of the following function.

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

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

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

Simplify the following boolean expression.

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

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))

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

$$\int_1^4 8t^{-1/2} - 12t^{3/2}\,dt$$

$$\left[8 \times t^{1/2} \times 2\right]_1^4 - \left[\frac{12 \times t^{5/2} \times 2}{5}\right]_1^4$$

$$\left[32 - 16\right] - \left[\frac{768}{5} - \frac{24}{5}\right] = 16 - \frac{744}{5}$$

$$= -\frac{664}{5} =$$

Consider the function f:R -> R $f(x) = x^2$. (real)

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

- Yes
- No

$f(x_1) = x_1^2$ — ①

$f(x_2) = x_2^2$ — ②

① = ②

$x_1^2 = x_2^2$

b) Is this an on to function?

- Yes
- No

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

$x = \pm\sqrt{y}$

b) Does the inverse exist?

- Yes
- No

b) What is the inverse function?

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

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

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

C_{11} Choose... 4

C_{12} Choose... −8

C_{13} Choose... 24

C_{21} Choose... 41

C_{22} Choose... 14

C_{23} Choose... −10

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

$128 = 4x - 40 + 168$

$x = 0$

$C_{11} = (-1)^2 \times 4 = 4$

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

$C_{13} = (-1)^4 \times 24 = 24$

$C_{21} = (-1)^3 \times -41 = 41$

$C_{22} = (-1)^4 \times 14 = 14$

$C_{23} = (-1)^5 \times 10 = -10$

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

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

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. $r_2' = r_2 - 6r_3$
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 = $-1/2$ k = $-1/10$ l = $2/5$

m = 0 n = $2/5$ o = $-3/5$

p = $-1/2$ q = $-1/10$ r = $2/5$

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

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

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

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

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

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

$$\xrightarrow{7} \begin{bmatrix} 1 & -2 & 0 & -1/2 & -1/10 & 2/5 \\ 0 & 1 & 0 & 0 & 2/5 & -3/5 \\ 0 & 0 & 1 & -1/2 & -1/10 & 2/5 \end{bmatrix}$$

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

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

a = b = c =

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 = b = c =

d = e = f =

g = h = i =

|A1| =

x =

d) Find y using the cramer's rule.

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

a = b = c =

Consider the function f:R -> R $f(x) = x^2+6$

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?

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

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

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

Is f an onto function? ✗ Choose...

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

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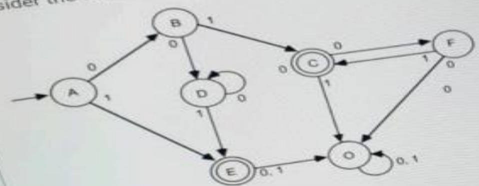
Question 13
Not yet answered
Marked out of 1.00
Flag question

Consider the following finite state Machine A.



What is the initial State? A

To what state does A go if 110101100 input to A in sequence starting from the initial state? O

Find N(C, 1) O

Find N(F, 0) O

Consider the following linear system of equations.

$x + y - z = -3$
$2x + 3y + z = 1$
$x - 4y - z = 7$

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 -> 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?

- ○ $f^{-1}(x) = (x-5)^{(1/2)}$
- ○ $f^{-1}(x) = 1/((x-5)^{1/2})$
- ○ $f^{-1}(x) = (x-5)^2$
- ● 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. $r_2' = r_2 - 6r_3$
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 = -1/2 k = -1/10 l = 2/5

m = 0 n = 2/5 o = -3/5

p = -1/2 q = -1/10 r = 2/5

...of the coefficient matrix A.

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

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

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

Choose...
No
Yes

Is f an onto function?

Does f has an inverse function? Choose...

Find the following definite integral.

$$\int_2^5 |4x - 5| dx$$

(Please remove spaces from the answer)

Answer: 27

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

$$\int_2^5 4x - 5 = \left[\frac{4x^2}{2}\right]_2^5 - \left[5x\right]_2^5$$

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

$$= 42 - 15$$

$$= 27 \;//$$

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 matri

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

a = : 1 b = : 2 c = : 1

d = : -2 e = : 3 f = : -3

g = : 0 h = : 4 i = : 2

p = : 5

q = : 4

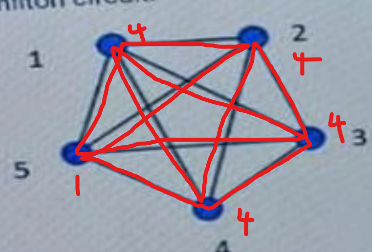
r = : 8

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

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

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

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

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

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

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

$$B = \begin{bmatrix} 1 & 2 \\ -2 & 11 \end{bmatrix}$$

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, writ... there in numerator and denominator))

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

A =

1	-2	3
-2	1	-2
3	-3	7

b =

-2
2
-2

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

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

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

1. $r_2' = r_2 + 2r_1$

$${}^5C_1 \times {}^8C_1 \times {}^7C_1 \times {}^6C_1$$

$$\frac{5!}{1! \times 4!} \times \frac{8!}{1! \times 7!} \times \frac{7!}{1! \times 6!} \times \frac{6!}{1! \times 5!} = \frac{5 \times \cancel{4!}}{1 \times \cancel{4!}} \times \frac{8 \times \cancel{7!}}{1 \times \cancel{7!}} \times \frac{7 \times \cancel{6!}}{1 \times \cancel{6!}} \times \frac{6 \times \cancel{5!}}{1 \times \cancel{5!}}$$

$$= 1680 \,//$$

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

Answer = : 1680

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

$${}^5C_1 + {}^8C_2 + {}^7C_1$$

$$\frac{5!}{1! \times 4!} + \frac{8!}{2! \times 6!} + \frac{7!}{1! \times 6!} = \frac{5 \times \cancel{4!}}{1 \times \cancel{4!}} + \frac{\cancel{8} \times 7 \times \cancel{6!}}{\cancel{2} \times 1 \times \cancel{6!}} + \frac{7 \times \cancel{6!}}{1 \times \cancel{6!}} = 40 \,//$$

Simplify the following boolean expression.

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

Select one:

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

use the calculator or

Find the derivative of the following function.

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

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

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

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 $Ax = b$.

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

a = 1 b = 2 c = 1
d = -2 e = 3 f = -3
g = 0 h = 4 i = 2
p = 5
q = 4
r = 8

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

b) Find the determinant of A. 18

$$|A| = 0 + [4 \times (-1)^5 \times -1] + [2 \times (-1)^6 \times 7]$$
$$|A| = 4 + 14 = 18$$

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 b = 2 c = 1
d = 4 e = 3 f = -3
g = 8 h = 4 i = 2

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

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

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

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)

$$f'(x) = 4x^3 - 2x + 0$$
$$f'(x) = 4x^3 - 2x$$
$$f'(-4) = 4 \times (-4)^3 - 2 \times (-4)$$
$$f'(-4) = (4 \times -64) + 8$$
$$f'(-4) = -248$$

$$\int_{-3}^{3} x^4 - x^2 + 20$$
$$\left[\frac{x^5}{5}\right]_{-3}^{3} - \left[\frac{x^3}{3}\right]_{-3}^{3} + \left[20x\right]_{-3}^{3}$$
$$\left[\frac{243}{5} + \frac{243}{5}\right] - \left[\frac{27}{3} + \frac{27}{3}\right] + [120]$$
$$\frac{486}{5} - \frac{54}{3} + 120 = \frac{1368}{15}$$
$$= \frac{456}{5}$$

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

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

$$f(t) = 4t^{-1} - \frac{1}{6}t^{-3} + 8t^{-5}$$
$$f'(t) = -4t^{-2} + \frac{3}{6}t^{-4} - 40t^{-6}$$
$$f'(t) = -4t^{-2} + \frac{1}{2}t^{-4} - 40t^{-6}$$

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

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

Equivalent **Binary** Number (x) = 1110100011100 ✓

Equivalent **Octal** Number (y) = 16434 ✓

Equivalent **Hexadecimal** Number (z) = 1D1C ✓

b) Find:

(Write your answer for 2's complement with **13 digits**)

2's Complement of x (x') = 1110 0010 1110 0100

8's Complement of y = 61344

16's Complement of z = E2E4

c) Fill in the blanks.

i) 10101010 + 11001100 = 101110110 (Write your answer with 9 digits)

ii) 11001100 − 10101010 = 00100010 (Write your answer with 6 digits)

iii) 1001100 × 1010 = 1011111000 (Write your answer with 10 digits)

iv) 1001100 ÷ 101

Quotient = 1111 (Write your answer with 4 digits)

Remainder = 01 (Write your answer with 2 digits)

Consider the following function.

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

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

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

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

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

$f'(-2) = 104$

1. Find f ' (-2) : 104

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

$$\int_{-2}^{2} x^5 + 2x^3 - 5 = \left[\frac{x^6}{6}\right]_{-2}^{2} + \left[\frac{2x^4}{4}\right]_{-2}^{2} - \left[5x\right]_{-2}^{2} \qquad 10 - (-10)$$

$$= \left[\frac{64}{6} - \frac{64}{6}\right] + \left[8 - 8\right] - \left[10 + 10\right]$$

$$= -20 \;//$$

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

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).

$$Ax = b$$

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

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

p =: 1 q =: 1

r =: -1 s =: 1

c =: 15

d =: 1

$$C_{11} = (-1)^2 \times 1 = 1$$
$$C_{12} = (-1)^3 \times -1 = 1$$
$$C_{21} = (-1)^3 \times 1 = -1$$
$$C_{22} = (-1)^4 \times 1 = 1$$

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

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 =: q =:

r =: s =:

c =:

d =:

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

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

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

$$\begin{bmatrix} a & b & c & p \\ d & e & f & q \\ g & h & i & r \end{bmatrix} \xrightarrow{r_2' = r_2 - 2r_1} \begin{bmatrix} a1 & b1 & c1 & p1 \\ d1 & e1 & f1 & q1 \\ g1 & h1 & i1 & r1 \end{bmatrix} \xrightarrow{r_3' = r_3 - 3r_1} \begin{bmatrix} a2 & b2 & c2 & p2 \\ d2 & e2 & f2 & q2 \\ g2 & h2 & i2 & r2 \end{bmatrix} \xrightarrow{r_3' = r_3 + r_2} \begin{bmatrix} a3 & b3 & c3 & p3 \\ d3 & e3 & f3 & q3 \\ g3 & h3 & i3 & r3 \end{bmatrix}$$

a =: 1	a1 =: 1	a2 =: 1	a3 =: 1
b =: -2	b1 =: -2	b2 =: -2	b3 =: -2
c =: 1	c1 =: 1	c2 =: 1	c3 =: 1
d =: 2	d1 =: 0	d2 =: 0	d3 =: 0
e =: 3	e1 =: 7	e2 =: 7	e3 =: 7
f =: -4	f1 =: -8	f2 =: -8	f3 =: -8
g =: 3	g1 =: 3	g2 =: 0	g3 =: 0
h =: -13	h1 =: -13	h2 =: -7	h3 =: 0
i =: 4	i1 =: 4	i2 =: 1	i3 =: -7
p =: 0	p1 =: 0	p2 =: 0	p3 =: 0
q =: -4	q1 =: -4	q2 =: -4	q3 =: -4

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

$$\downarrow$$

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

Obtain the truth table for the following expression.

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

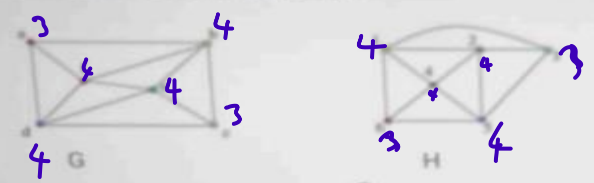
A	B	C	$\overline{A}\,B\,\overline{C}$	$\overline{A}\,BC$	$\overline{A}\,\overline{B}\,C$	D
0	0	0	0	0	0	0
0	0	1	0	0	1	1
0	1	0	1	0	0	1
0	1	1	0	1	0	1
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	0	0	0
1	1	1	0	0	0	0

Find the following definite integral.

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

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

Consider the following 2 graphs.



	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

To buy a computer system, a customer can choose one of 8 monitors, one of 8 keyboards, one o 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 1.00
Flag question

Consider the following linear system of equations

$x - 2y - z = 4$
$3x - 2y + 3z = 0$
$2x - 3y + 2z = 5$

$$\underbrace{\begin{pmatrix} 1 & -2 & -1 \\ 3 & -2 & 3 \\ 2 & -3 & 2 \end{pmatrix}}_{A} \underbrace{\begin{pmatrix} x \\ y \\ z \end{pmatrix}}_{x} = \underbrace{\begin{pmatrix} 4 \\ 0 \\ 5 \end{pmatrix}}_{b}$$

(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 fact… denominator))

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

A =

1	-2	-1
3	-2	3
2	3	2

b =

4
0
5

b) Consider the following. Find the values of the resulting matrix, when the following elementa… 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. $r_3' = r_3 - \frac{1}{4}r_2$

If |A| = 128 then find the cofactor matrix of …

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

C_{11} Choose...

Choose...
10
24
41
23
14
-14
4
-10
-4
15
-23
40
8
-40
-8

C_{12}

C_{13}

C_{21}

C_{22} Choose...

C_{23} Choose...

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

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

Is f a One to one function? No

Is f an onto function? No

Does f has an inverse function? No

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

Find f ' (-2).

Hint : Differentiate the function and Substitute -2.

(No spaces should be in the answer)

Answer: -6

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

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

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

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

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

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

Consider the following function.

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

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

Hint : Find the inverse of g and substitute 4.

Answer: 5

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

$2y = 3x - 7$

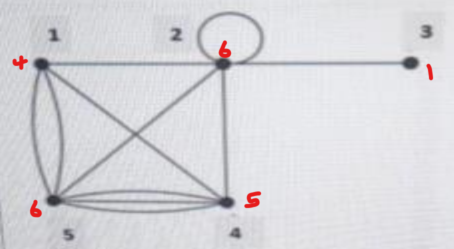
$3x = 2y + 7$

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

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

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

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} -15

C_{12} 20

C_{13} 14

C_{21} 4

C_{22} -9

C_{23} 2

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).

$$Ax = b$$

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

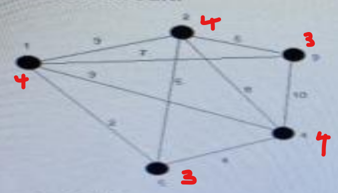
p =: q =:

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

1 * X + 1 * 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.

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

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

Hint : Find the inverse of g and substitute 2.

Answer: -3

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

$3y = 9 + x$

$x = 3y - 9$

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

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

$= -3$ //

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 answ

Answer: 11/2

11/2

$x = 4/3 = 1.3$

$-1 \quad 0 \quad 4/3$

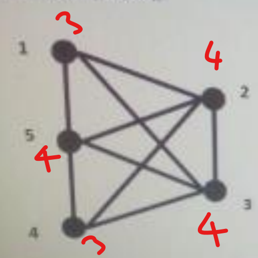
$\int_{-1}^{0} -(3x - 4)$

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

$0 - \left(\frac{-3}{2} - 4\right)$

$11/2$ //

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



Euler Path =

- Yes
- No

H.C = Yes

Euler Circuit =

- Yes
- No

Hamilton Path = Yes

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 = 110000111 (Write your answer with 9 digits)

ii) 11011001 − 10101110 = 101011 (Write your answer with 6 digits)

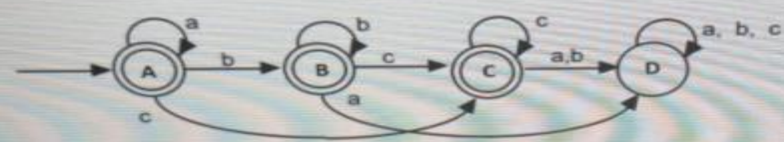
iii) 11011101 × 110 = 10100101110 (Write your answer with 11 digits)

iv) 11011101 ÷ 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 Choose...

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

Find N(C, a) D Choose...

Find N(D, b) D Choose...

Next page

Consider the function f:R -> R f(x) = x^2-1

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?

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

Find the following definite integral.

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

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

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

$$\left[\frac{5z^3}{3}\right]_{-2}^{1} - \left[\frac{7z^2}{2}\right]_{-2}^{1} + \left[3x\right]_{-2}^{1}$$

$$\left[\frac{5}{3} + \frac{40}{3}\right] - \left[\frac{7}{2} - \frac{28}{2}\right] + \left[3+6\right]$$

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

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

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)

$$f: N \to N \;\; f(n) = x^2 + 3$$

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

Is f an onto function? ✗ Choose...

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

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Consider the following linear system of equations.

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

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

(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 =

1	2	-1
2	1	1
3	-1	2

b =

2
7
7

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.

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

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

$${}^4C_1 \times {}^6C_1 \times {}^3C_1 \times {}^6C_1$$
$$\frac{4!}{1! \times 3!} \times \frac{6!}{1! \times 5!} \times \frac{3!}{1! \times 2!} \times \frac{6!}{1! \times 5!}$$
$$4 \times 6 \times 3 \times 6$$
$$\underline{\underline{432}}$$

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

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

Answer = : 13

$${}^4C_1 + {}^6C_1 + {}^3C_1$$
$$\frac{4!}{1! \times 3!} + \frac{6!}{1! \times 5!} + \frac{3!}{1! \times 2!} = 4 + 6 + 3 = \underline{\underline{13}}$$

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 * X + 30 * Y = 2350

50 * X + 40 * Y = 3300

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

$$Ax = b$$

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

$$\begin{bmatrix} 35 & 30 \\ 50 & 40 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2350 \\ 3300 \end{bmatrix}$$

p =: 35 q =: 30

r =: 50 s =: 40

c =: 2350

d =: 3300

$C_{11} = (-1)^2 \times 40 = 40$

$C_{12} = (-1)^3 \times 50 = -50$

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

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

$$C = \begin{bmatrix} 40 & -50 \\ -30 & 35 \end{bmatrix}$$

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

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

a1 =: 40 a2 =: -50

a3 =: -30 a4 =: 35

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

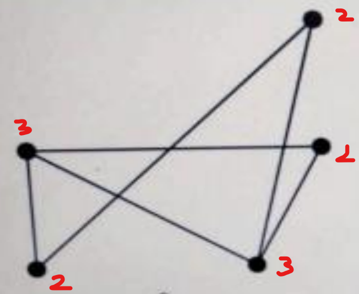
Find f ' (-2).

Hint : Differentiate the function and Substitute -2.

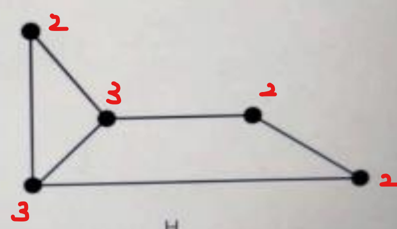
(No spaces should be in the answer)

Answer: -6

Consider the following 2 graphs.



G



H

	G	H
Number of Components	1	1
Number of Vertices	5	5
Number of Edges	6	6
Degree Sequence	3, 3, 2, 2, 2	3, 3, 2, 2, 2

Are they isomorphic?

G and H are

Isomorphic.

Not 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

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

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

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

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

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

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

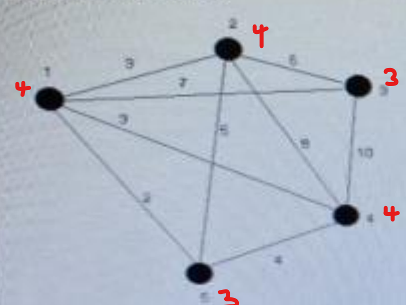
$$f: N \to N \quad f(n) = x^3 - 2x + 1$$

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

Is f an onto function? X Choose...

Does f has an inverse function? X 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)

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

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))

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

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

$f'(y) = 2y - 0 - 2 \times 2 \times y^{-3}$

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

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 = :

Find the derivative of the following function.

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

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

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

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

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

Consider the following linear system of equations.

2x + y - z = 6
3x - 2y - 3z = 3
-x + y + 2z = -3

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

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

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

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

b) Find the determinant of A. -6

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 = 6 b = 1 c = -1
d = 3 e = -2 f = -3
g = -3 h = 1 i = 2

$$A_1 = \begin{bmatrix} 6 & 1 & -1 \\ 3 & -2 & -3 \\ -3 & 1 & 2 \end{bmatrix}$$

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

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

$$|A_1| = 0 \,//$$

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

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?

80 * X + 50 * Y = 5700

1 * X + 1 * Y = 90

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

$$Ax = b$$

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

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

p = 80 q = 50

r = 1 s = 1

c = 5700

d = 90

b) Find the cofactor matrix(C) of A

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

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

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

$C_{21} = (-1)^3 \times 50 = -50$

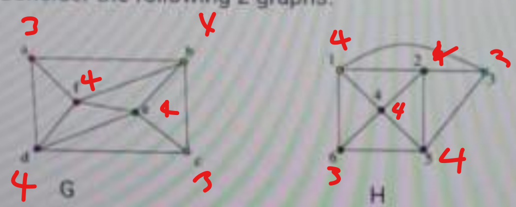
$C_{22} = (-1)^4 \times 80 = 80$

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

a1 = 1 a2 = -1

a3 = -50 a4 = 80

Consider the following 2 graphs.



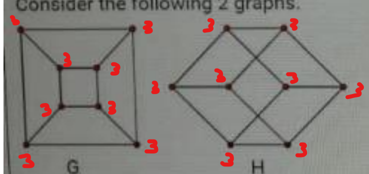
	G	H
Number of Components	1	1
Number of Vertices	6	6
Number of Edges	11	11
Degree Sequence	4, 4, 4, 4, 3, 3	4, 4, 4, 4, 3, 3

Are they isomorphic?

G and H are

- ○ isomorphic
- ◉ Not isomorphic

Consider the following 2 graphs.



	G	H
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))

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

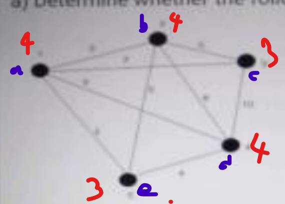
$$\left[\frac{\cancel{12}^{\,3}x^4}{\cancel{4}}\right]_1^6 - \left[\frac{9x^3}{3}\right]_1^6 + \left[2x\right]_1^6$$

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

$$3885 - 645 + 10$$

$$3250 \,//$$

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

Adjacency matrix =

$$\begin{array}{c|cccc} & a & b & c & d \\ \hline a & & & & \\ b & & & & \\ c & & & & \\ d & & & & \end{array} \quad \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

Consider the following function.

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

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

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

Answer: 8

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

$$4y = 12 - 3x$$

$$3x = 12 - 4y$$

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

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

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

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

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

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

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

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

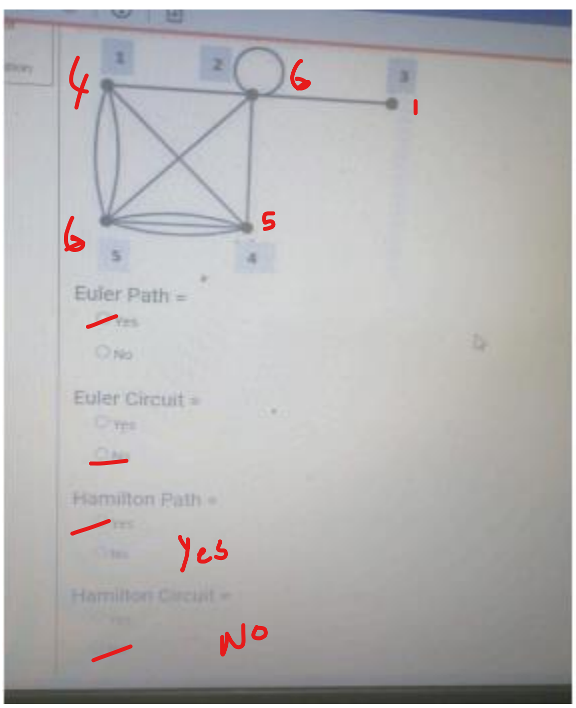
b = : -6

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.

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

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)

$$f: N \to N \;\; f(n) = x^3 - 3$$

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

$$f'(x) = 3x^2 - (2\times 2\times x) + 0$$
$$f'(x) = 3x^2 - 4x$$
$$f'(-3) = 3\times(-3)^2 - (4\times(-3))$$
$$f'(-3) = 27 + 12$$
$$f'(-3) = 39 \ //$$

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

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

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

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