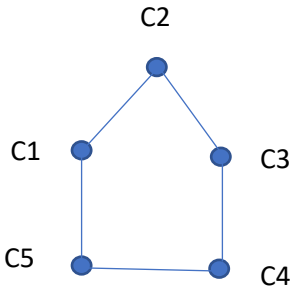
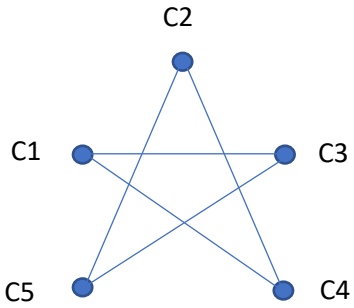
1) What is the correct statement about the following 2 graphs?





vertices =
edges =
sequence =
structure =
component =

Select one:

1. Two graphs are isomorphic
2. Two graphs are not isomorphic
3. The two graphs have different degree sequences
4. None of the above

2) Consider the following linear system

$x + y + z = 0$
$2x + 3y + z = 4$
$x - 3y + 2z = -10$

A.x =b

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & 1 \\ 1 & -3 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ -10 \end{bmatrix}$$

$$\begin{matrix} 1 & 1 & 1 & 1 & 1 \\ 2 & 3 & 1 & 2 & 3 \\ 1 & -3 & 2 & 1 & -3 \end{matrix}$$

|A| = -3

$x = \frac{|A1|}{|A|} = \frac{0}{-3} = 0$ $y = \frac{|A2|}{|A|} = \frac{-6}{-3} = 2$ $z = \frac{|A3|}{|A|} = \frac{6}{-3} = -2$

A1 = $\begin{matrix} 0 & 1 & 1 & 0 & 1 \\ 4 & 3 & 1 & 4 & 3 \\ -10 & -3 & 2 & -10 & -3 \end{matrix}$

|A1| = 0

A2 = $\begin{matrix} 1 & 0 & 1 \\ 2 & 4 & 1 \\ 1 & -10 & 2 \end{matrix}$

|A2| = -6

A3 = $\begin{matrix} 1 & 1 & 0 \\ 2 & 3 & 4 \\ 1 & -3 & -10 \end{matrix}$

|A3| = 6

Find the following.

|A1| =

|A2| =

|A3| =

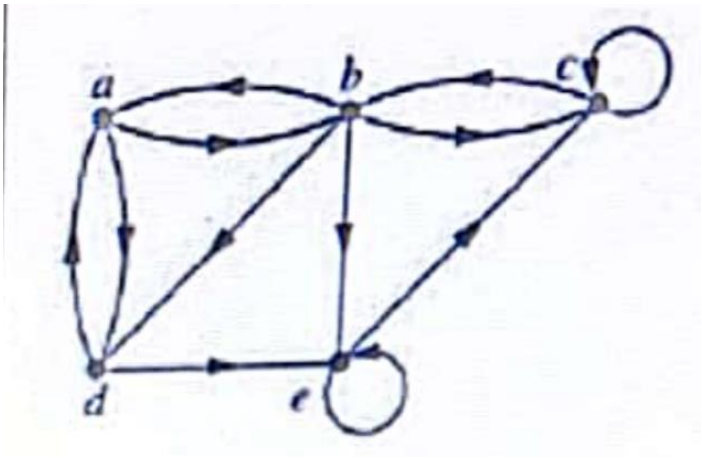
|A| =

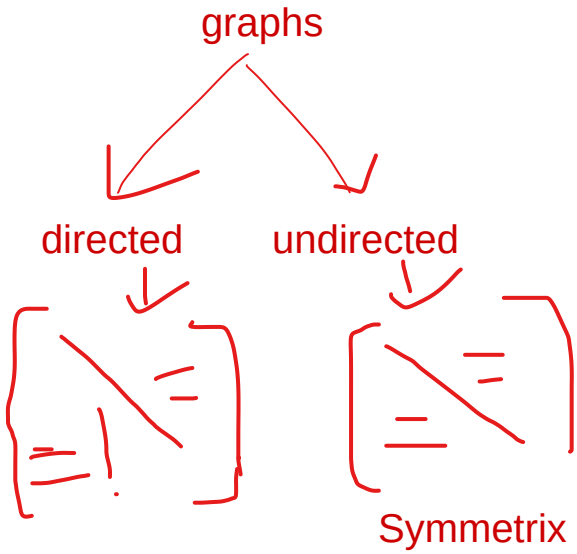
x =

y =

z =

3) Consider the following Directed Graph





Number of edges = 12
Total Indegree = 12
Total outdegree = 12

4) Number of edges in graph G is 8. Assume that there are 4 vertices with equal degree values.

Total degree = 16

Degree of a one vertex = 4

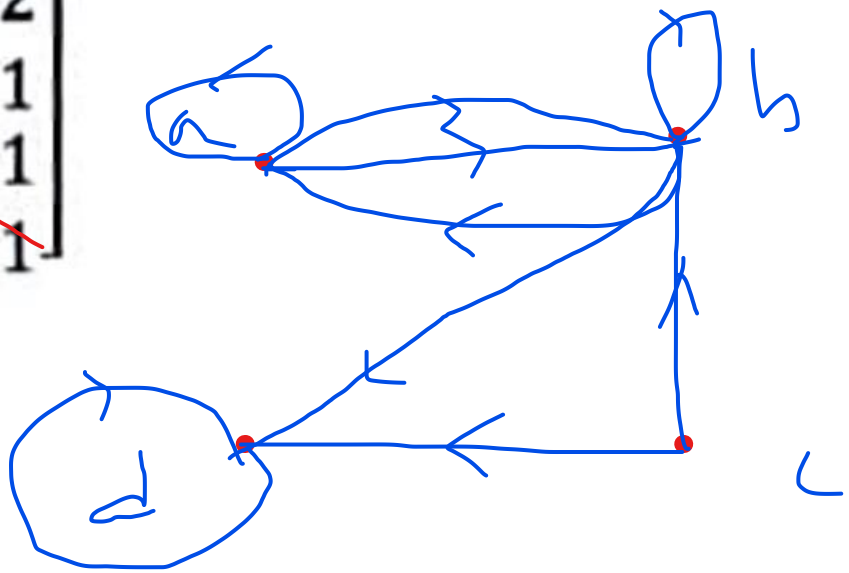
Does an Euler Circuit exist in G? yes/no yes

Does an Euler Path in G? yes/no no

Number of components of G = 1

5) Following adjacency matrix represents a graph

	a	b	c	d
a	1	0	0	2
b	1	1	0	1
c	0	1	0	1
d	0	0	0	1



This graph is a

- ○ Undirected Graph
- ○ Directed Graph

Number of loops: 3

Number of Edges: 9

Number of Vertices: 4

6) A = 100101101 + 100110101
Find the 2's Complement of A

0110011110

7) Find f ' (2)

$$f(x) = 3/x^4 - 2x^2 + 6x - 7.$$

3x^-4 - 2x^2 + 6x -7

f'x = (3 * (-4) x^ -5) - (2 * 2 x) + 6
= -12 * x^-5 - 4x +6
= -12 / x^5 - 4x +6

f'(2) = -12 / 32 - 4 *2 + 6
= -19/8

8) What is the value of x?
Int x = 50 % 6 + 2 * 3 + (4 – 1) / 2 + 9

= 2 + 6 + 3/2 + 9
=17 + 3/2
= 37/2

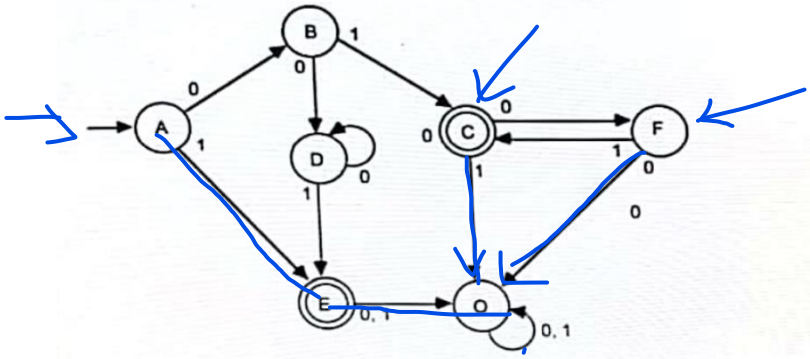
()
/
%
*
+
-

9) Simplify the following Boolean expression

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

A' + (B' C' + BC)'
A' + (B'C')' . (BC)'
A' + (B + C). (B'+C')

10) 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?

Find N(C, 1) 0

Find N(F, 0) 0

11) If repetition is not allowed, then how many numbers between 2000 and 3000 can be formed using the digits from 0 to 7? 210

1 x 7 x 6 x 5

12) In a cricket tournament there are 15 matches. If each team plays one match with every other team, the number of team is:

15 = n(n-1)/2
30 = n(n-1)

n=6

13)

The function $f : \mathbb{Z} \to \mathbb{Z}$ defined by

$$f(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even} \\ \frac{n+1}{2} & \text{if } n \text{ is odd} \end{cases}$$

Is the function one to one ?

Yes

No

Is the function onto?

No

Yes

f

Nomal

5x + 3

|x|

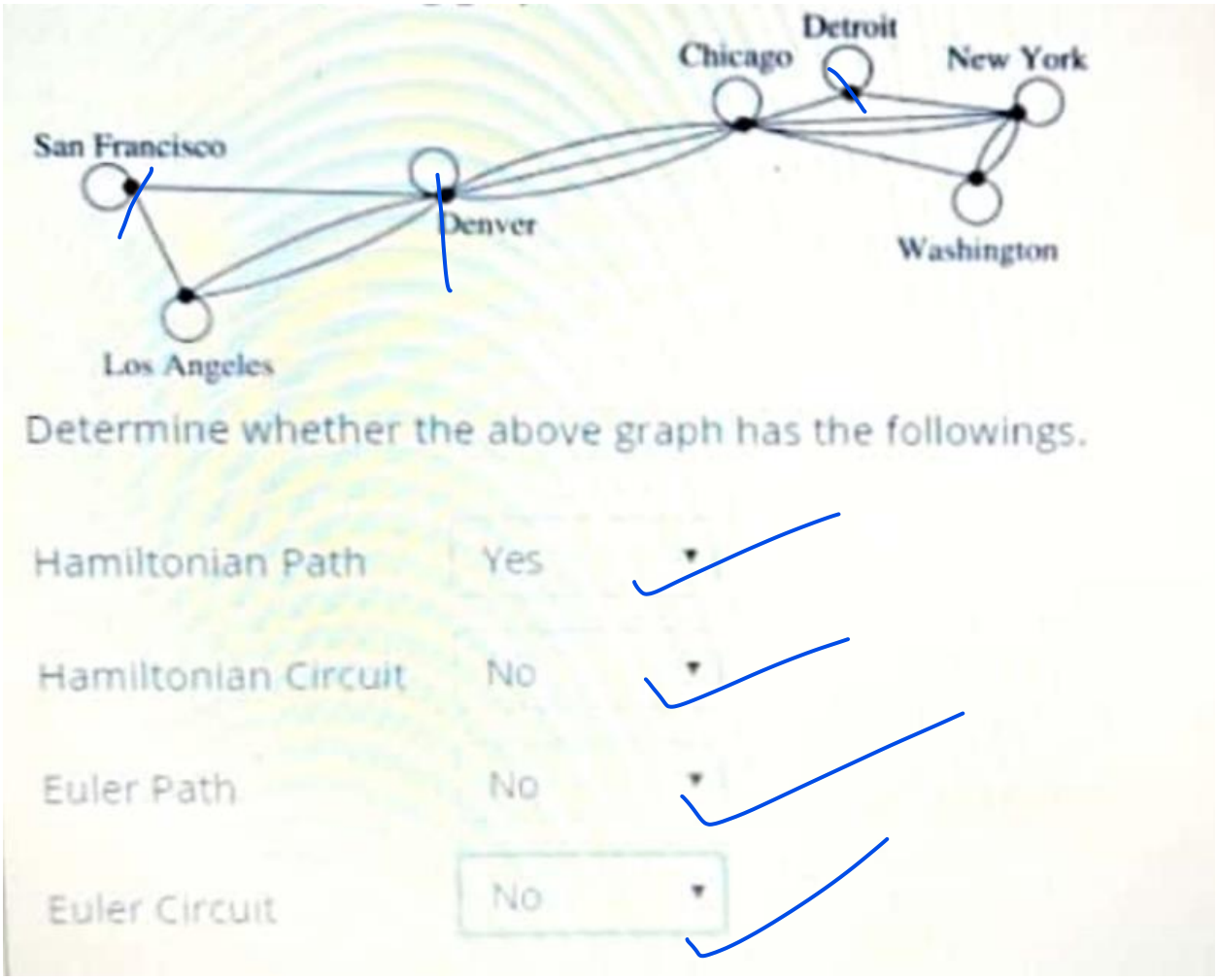
x^2

mula x

one to one not

14) How many numbers not exceeding 10000 can be made using the digits 2,4,5,6,8 if repetition of digits is allowed? 780

15) Consider the following graph



16)

$$f(x)=\frac{x^2+1}{5x-3}$$

Find f ' (-1)
(Differentiate the function and substitute)

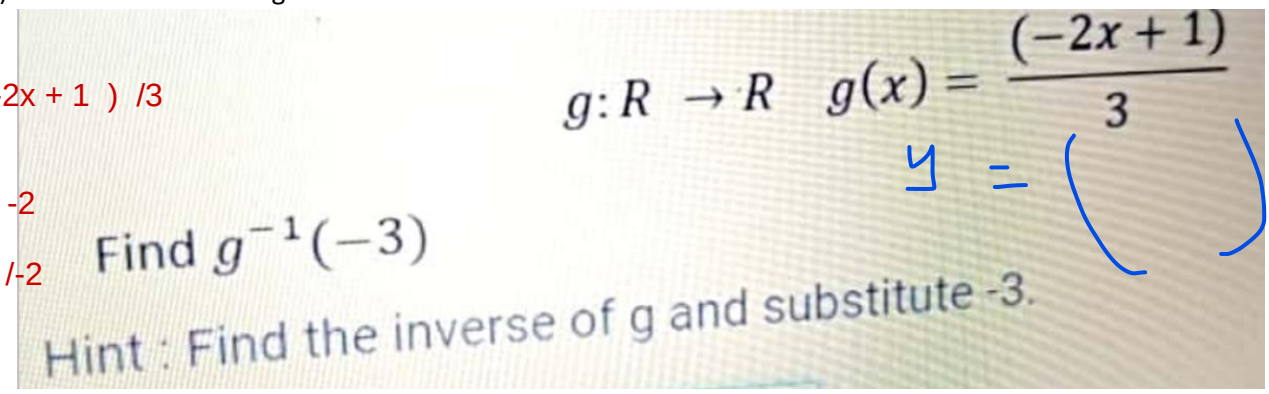
$$\frac{(5x-3)\,2x-(x^2+1)\,5}{(5x-3)^2}$$

10x^2 - 6x - 5x^2 - 5 /64

5x^2 -6x -5 / 64

-3/32

17) Consider the following function



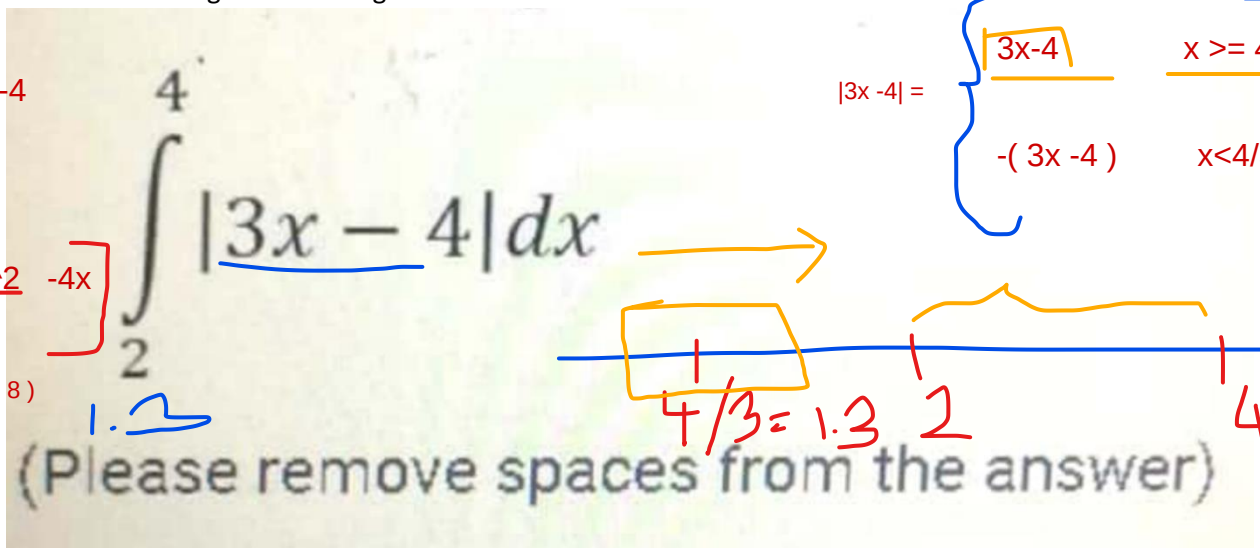
y = (-2x + 1) /3

(3y -1) / -2 = x

g-1(x) = (3x -1) / -2

g-1(-3) = (-9 -1) /-2
= 5

18) Find the following definite integral



3x -4

|3x -4| = 3x-4 if x >= 4/3; -(3x -4) if x<4/3

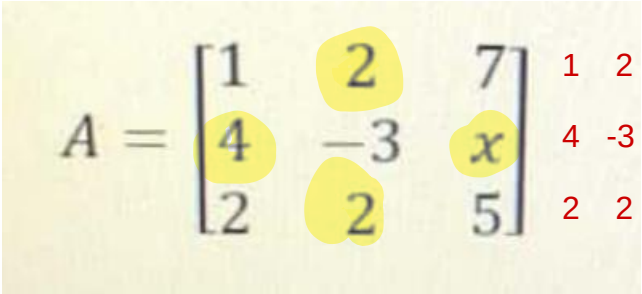
4 [3 x ^2 / 2 -4x] 2

48/ 2 - 16 -(12/2 - 8)

8 +2
10

4/3 = 1.3

19) If |A| = 43 then find the cofactor matrix of A



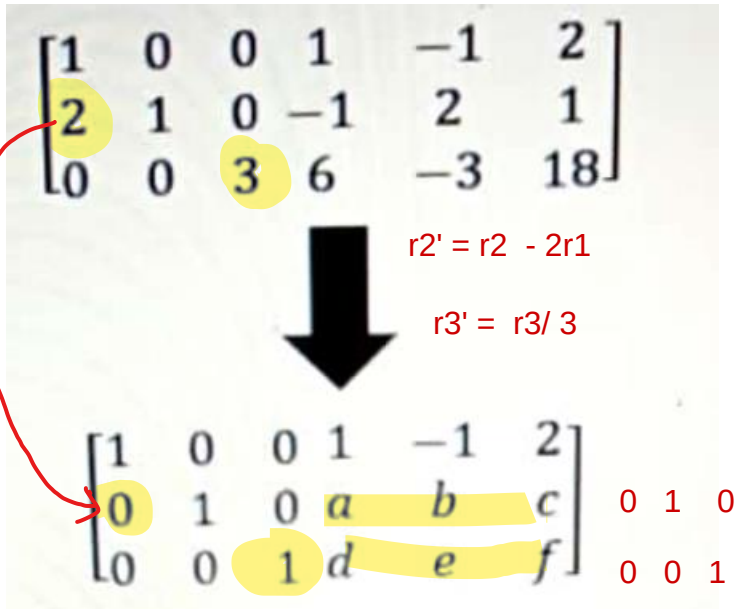
1 2
4 -3
2 2

-15 +4x + 56 -(- 42 + 2x + 40) = 43
x = 0

C11 = -15
C12 = -20
C13 = 14
C14 =
C21 = 4
C22 = -9
C23 = 2
C31 = 21
C32 = 28
C33 = -11

c = -15 - (20) 14
-(-4) -9 -(-2)
21 -(-28) -11

20)



$$\begin{bmatrix} 1 & 0 & 0 & 1 & -1 & 2 \\ 2 & 1 & 0 & -1 & 2 & 1 \\ 0 & 0 & 3 & 6 & -3 & 18 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 1 & -1 & 2 \\ 0 & 1 & 0 & a & b & c \\ 0 & 0 & 1 & d & e & f \end{bmatrix}$$

0 1 0 -3 4 -3

0 0 1 2 -1 6

Find the values of a, b, c, d, e, f

21) $3x - 5y = 1$

$4x - 3y = 5$

Represent the above equation in Ax = b form

adj A = cT

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

Find the following

|A| = 11

p =

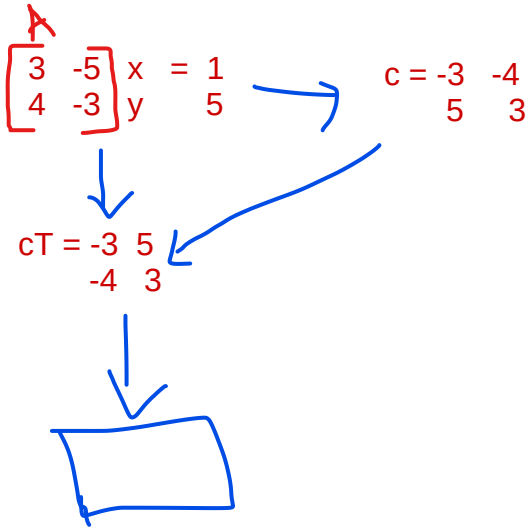
q =

r =

s =

x =

y =



22) Find the determinant of A

$$A = \begin{bmatrix} 2 & -3 & 5 \\ -3 & 6 & 2 \\ 1 & -2 & 5 \end{bmatrix}$$

23) Find the values of the resulting matrix

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

r2' = r2 - r3

r1' = r1+ r3

$$\begin{bmatrix} 1 & 0 & 0 & a & b & c \\ 0 & 1 & 0 & d & e & f \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

24)

$$A = \begin{bmatrix} 3 & 2 \\ 5 & 4 \end{bmatrix}$$

cT = 4 -2
-5 3

Find the determinant of the above matrix.: 2

Find the inverse of the matrix A. $A^{-1} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

a = : 2

b = : -1

c = : -2.5

d = : 1.5

(Write your answer with one decimal place)

25)

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

Find $D = B^2 + AB - I$

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

-3I = 3 0 0
0 3 0
0 0 3

a = : 9

b = : 14

c = : -29

d = : 76