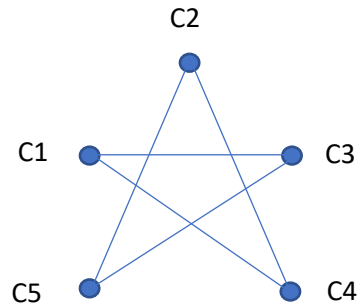
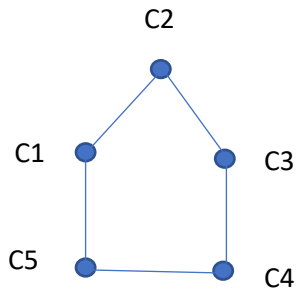


1) What is the correct statement about the following 2 graphs?



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

$$x + y + z = 0$$

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

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

$$x = \frac{|A1|}{|A|} \quad y = \frac{|A2|}{|A|} \quad z = \frac{|A3|}{|A|}$$

Find the following.

$$|A1| =$$

$$|A2| =$$

$$|A3| =$$

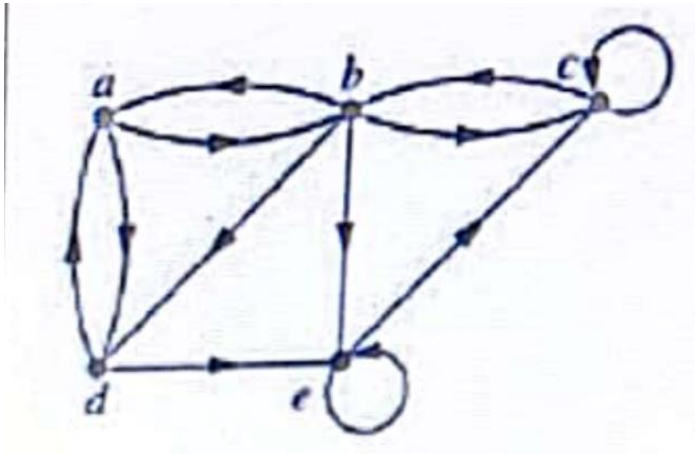
$$|A| =$$

$$x =$$

$$y =$$

$$z =$$

3) Consider the following Directed Graph



Number of edges =

Total Indegree =

Total outdegree =

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

Total degree =

Degree of a one vertex =

Does an Euler Circuit exist in G? yes/no

Does an Euler Path in G? yes/no

Number of components of G =

5) Following adjacency matrix represents a graph

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

This graph is a

- ☐ Undirected Graph
- ☐ Directed Graph

Number of loops:

Number of Edges:

Number of Vertices:

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

7) Find $f'(2)$

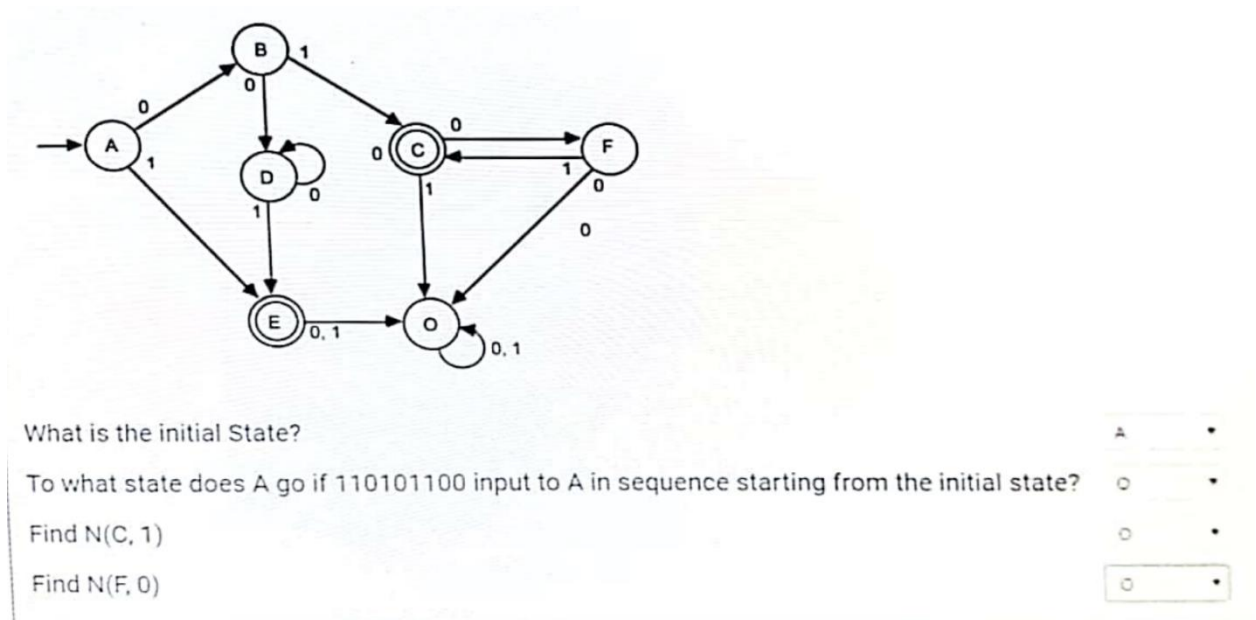
$$f(x) = 3/x^4 - 2x^2 + 6x - 7.$$

8) What is the value of x?
 $\text{Int } x = 50 \% 6 + 2 * 3 + (4 - 1) / 2 + 9$

9) Simplify the following Boolean expression

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

10) Consider the following finite state machine A



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

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

13)

The function $f : \mathbb{Z} \rightarrow \mathbb{Z}$ 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

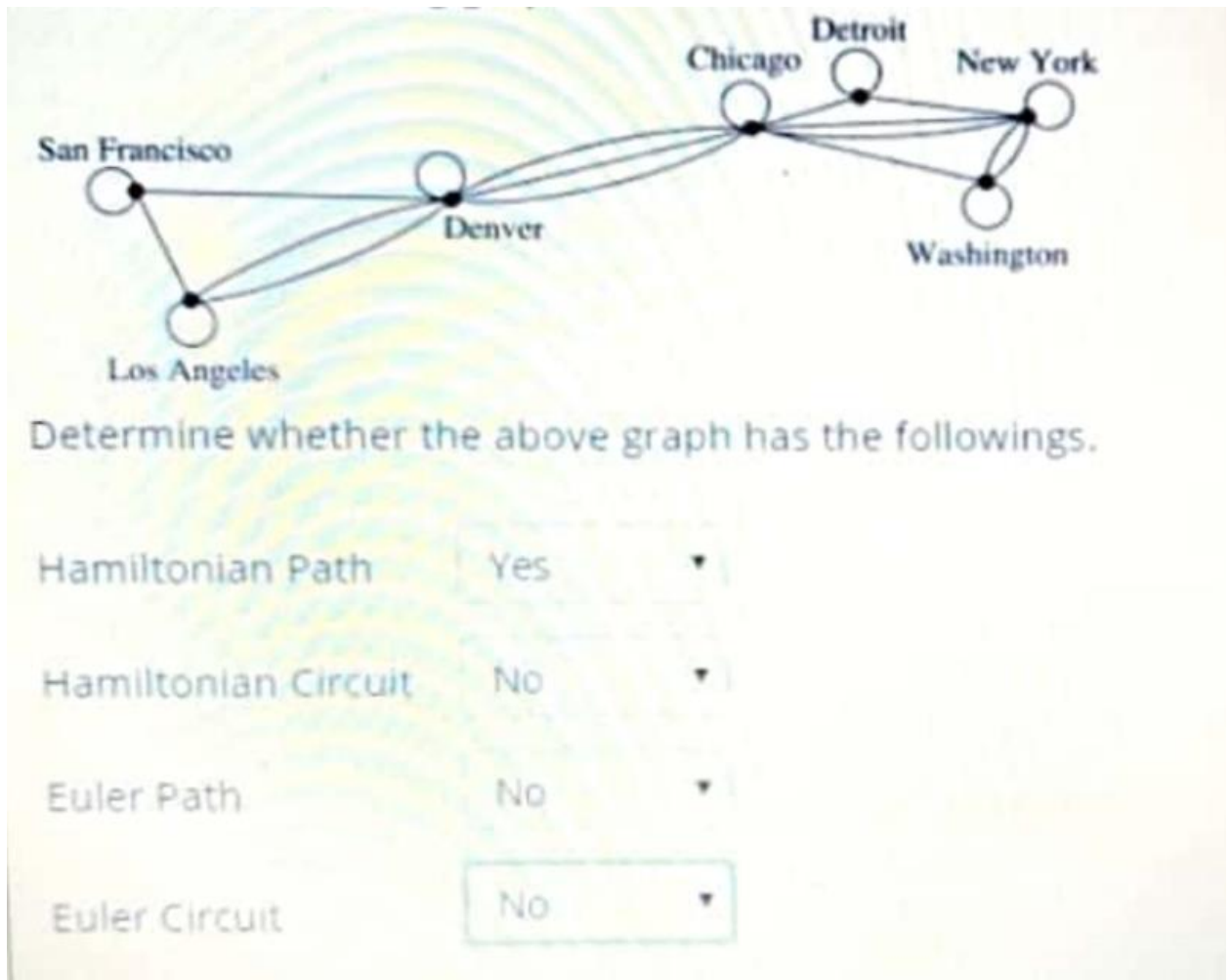
Is the function onto?

☐ No

☒ Yes

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

15) Consider the following graph



16)

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

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

17) Consider the following function

$$g: \mathbb{R} \rightarrow \mathbb{R} \quad g(x) = \frac{(-2x + 1)}{3}$$

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

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

18) Find the following definite integral

$$\int_2^4 |3x - 4| dx$$

(Please remove spaces from the answer)

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

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

C11 =

C12 =


C13 =

C14 =

C21 =

C22 =

20)

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


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

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

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

Find the following

$|A| =$

$p =$

$q =$

$r =$

$s =$

$x =$

$y =$

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

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

↓

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

24)

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

Find the determinant of the above matrix.:

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

a = :

b = :

c = :

d = :

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

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

a = :

b = :

c = :

d = :

