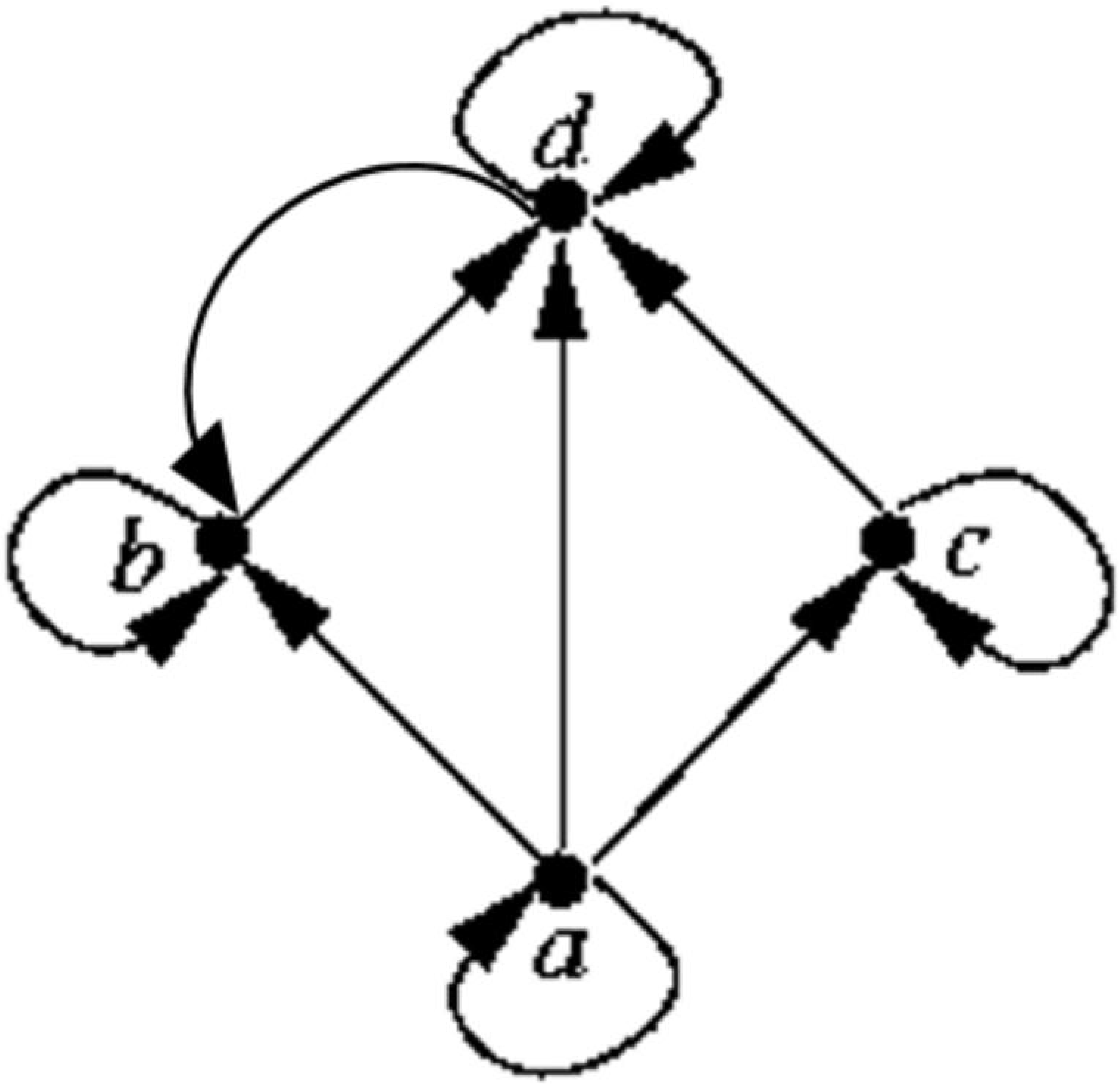
Question 19

The relation for directed graph shown below is a partial order.



- [x] True
- [ ] False

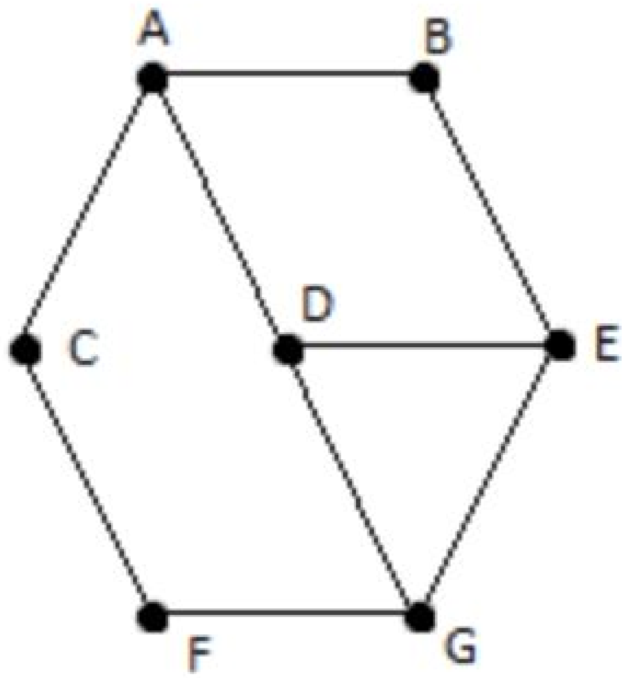
Question 20

The negation of $\forall x(x > o \land x^2 = 1)$ is

- A. $\exists x(x \leq o \lor x^2 \neq 1)$
- B. $\forall x(x \leq o \lor x^2 \neq 1)$
- C. $\forall x(x \leq o \land x^2 \neq 1)$
- D. $\exists x(x \leq o \land x^2 \neq 1)$

Question 21

Let G be this graph



Then which choice is a simple path of length 4?

- A. ABEDE
- B. ACFGD
- C. AGEBA
- D. ADEBA

Question 22

For the universal U={1,2,3,4,5}, let A={1,3}, and B=(4,5}. Then the set X={3) is a subset of $\overline{A} \cap B$

- ( ) True
- (•) False

Question 23

The Wheel graph W_5 is a planar graph?

- [x] True
- [ ] False

Question 24

The argument

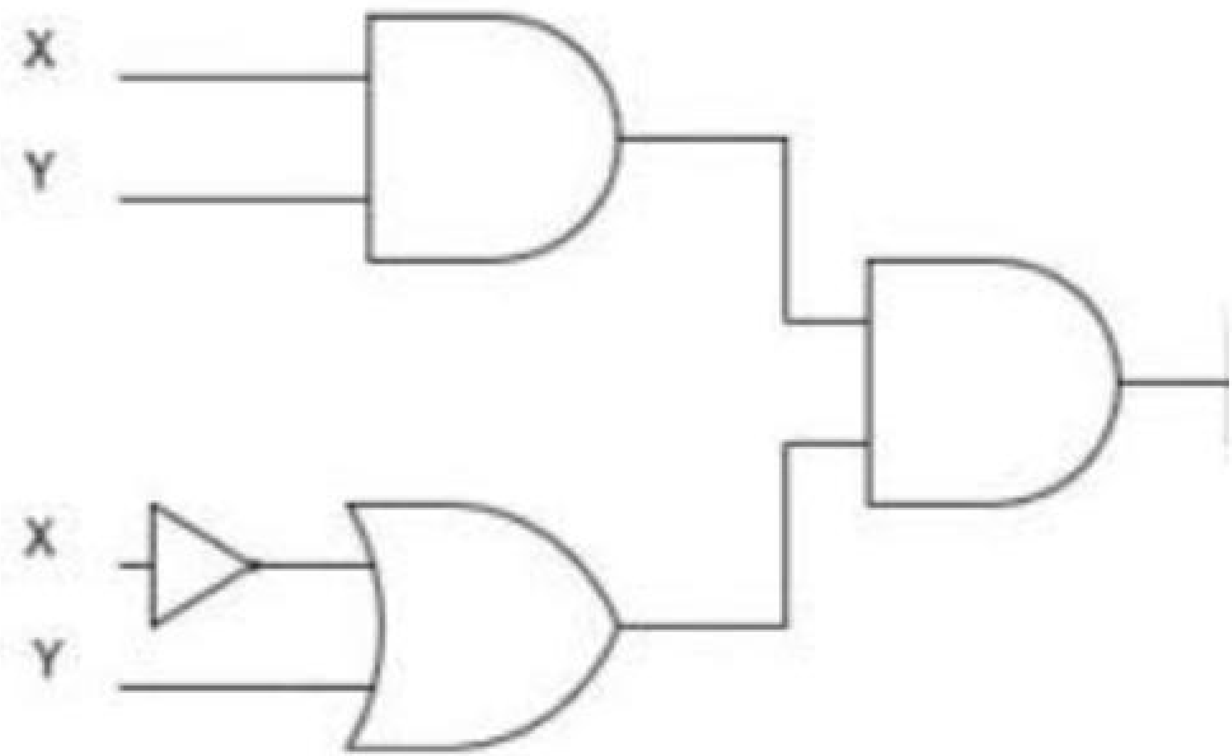
$$\begin{array}{l} \neg p \to q \\ r \to s \\ \neg r \\ \hline \therefore s \to q \end{array}$$

is

- A. Undetermined
- B. Invalid
- C. Valid

Question 25

The output of the given circuit is



- [ ] A. $(xy).(\overline{x}y)$
- [ ] B. $(xy)+(\overline{x}+y)$
- [ ] C. $(x+y).(\overline{x}+y)$
- [x] D. $(xy).(\overline{x}+y)$

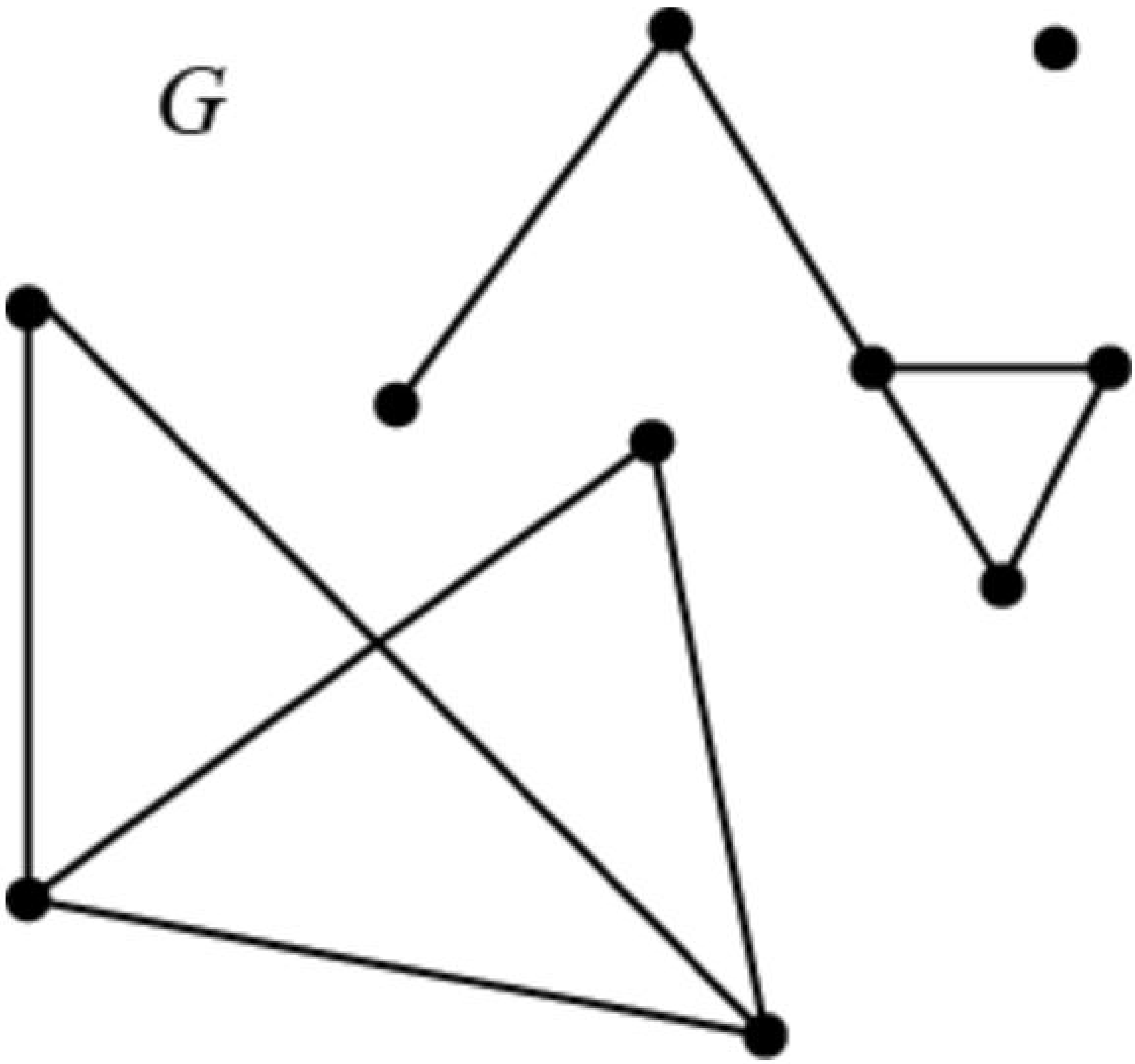
Question 27

The square of an odd number is

- A. undecided
- B. odd
- C. even

Question 29

How many components the graph has



- A. 4
- B. 3
- C. 2
- D. 1

Question 31

At the rooted tree  what is t he descndants of the vertex E ?

- ● K, L, P, Q
- ○ B, C, D, F, G
- ○ A
- ○ I, J, M

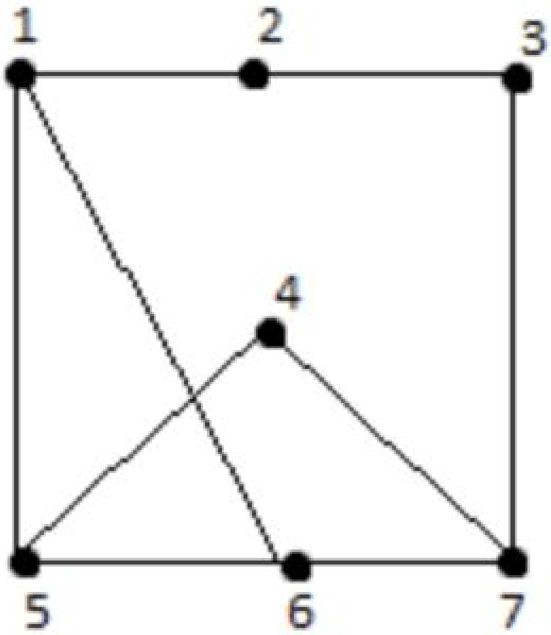
Question 1

Which complete bipartite graph $K_{m,n}$ is a tree?

- A. $K_{1,4}$
- B. $K_{2,2}$
- C. $K_{2,3}$
- D. $K_{3,3}$

Question 2

Let G be this graph



Then which choice is a simple path of length 4?

- A. 4 7 6 5 1
- B. 1 6 7 3 7
- C. 4 7 6 5 4
- D. 4 5 6 1 4

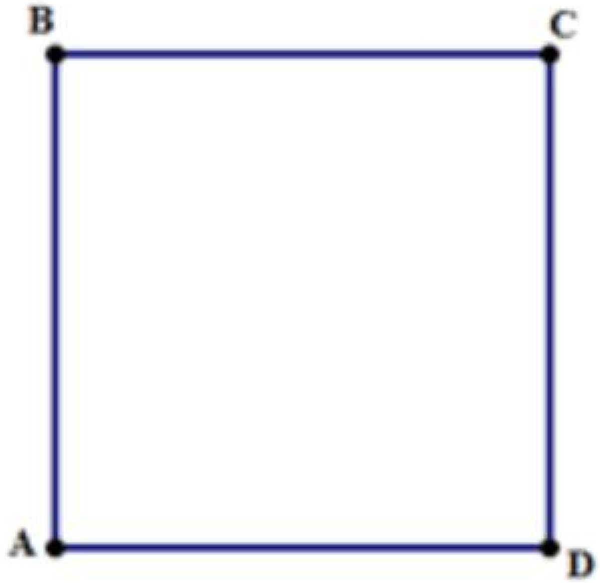
Question 3

Let R={(1,1),(1,3),(2,3),(3,1),(3,3)} be a relation defined on A={1,2,3,4,5}. The reflexive closure of R is

- A. {(1,1),(1,3),(2,3),(3,1),(3,3),(2,2)}
- B. {(1,1),(1,3),(2,3),(3,2),(3,1),(3,3),(2,2),(4,4),(5,5)}
- C. {(1,1),(1,3),(2,3),(3,1),(3,3),(2,1)}
- D. {(1,1),(1,3),(2,3),(3,1),(3,3),(2,2),(4,4),(5,5)}

Question 4

How many possible spanning tree of the graph



A. 4

B. 5

C. 3

D. 2

Question 5

On $\mathbb{N}$, the relation $R = \{(a,b): b = 2^k a,\ for\ some\ integer\ k \geq 0\}$ is a total ordering on $\mathbb{N}$

- True
- False

Question 6

If (1-n) is even then n^2 is

- A. even
- B. odd
- C. undecided

Question 7

For A and B arbitrary sets, $\overline{(A \cup B) \cap B}$ equals

- A. $\overline{A} \cup B$
- B. $\overline{B}$
- C. $\overline{A} \cap \overline{B}$
- D. A

Question 8

The dual of the Boolean expression $(\overline{x}.y)+(\overline{x}.1)+(x.0)$ is

- A. $(\overline{x}+y).(\overline{x}+0).(x+1)$
- B. $(\overline{x}.y)+(\overline{x}.0)+(x.1)$
- C. $(x+\overline{y}).(x+0).(\overline{x}+1)$
- D. $(x+\overline{y}).(x+1).(\overline{x}+0)$

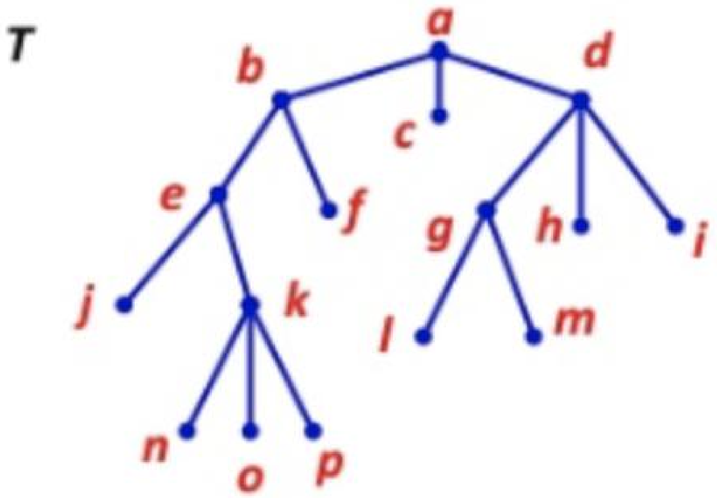
Question 9

The Boolean expression for the function that has the values in the table below

x	y	z	F(x,y,z)
1	1	1	1
1	1	0	0
1	0	1	1
1	0	0	1
0	1	1	0
0	1	0	0
0	0	1	1
0	0	0	0

- A. $xyz+x\overline{y}z+\overline{xy}z$
- B. $xyz+x\overline{y}z+x\overline{yz}+\overline{xy}z$
- C. $xyz+\overline{xyz}+x\overline{y}z+x\overline{yz}$
- D. $xyz+x\overline{yz}+\overline{x}yz+\overline{xy}z$

Question 10

At the rooted tree  what is t he ancestors of the vertex e ?

- [x] a, b
- [ ] j, l, m
- [ ] f
- [ ] j, k, n, o, p

Question 11

For the universal U={1,2,3,4,5}, let A={1,3}, and B=(4,5}. Then the set X={3) is a subset of $\overline{B} - A$

- ○ True
- ◉ False

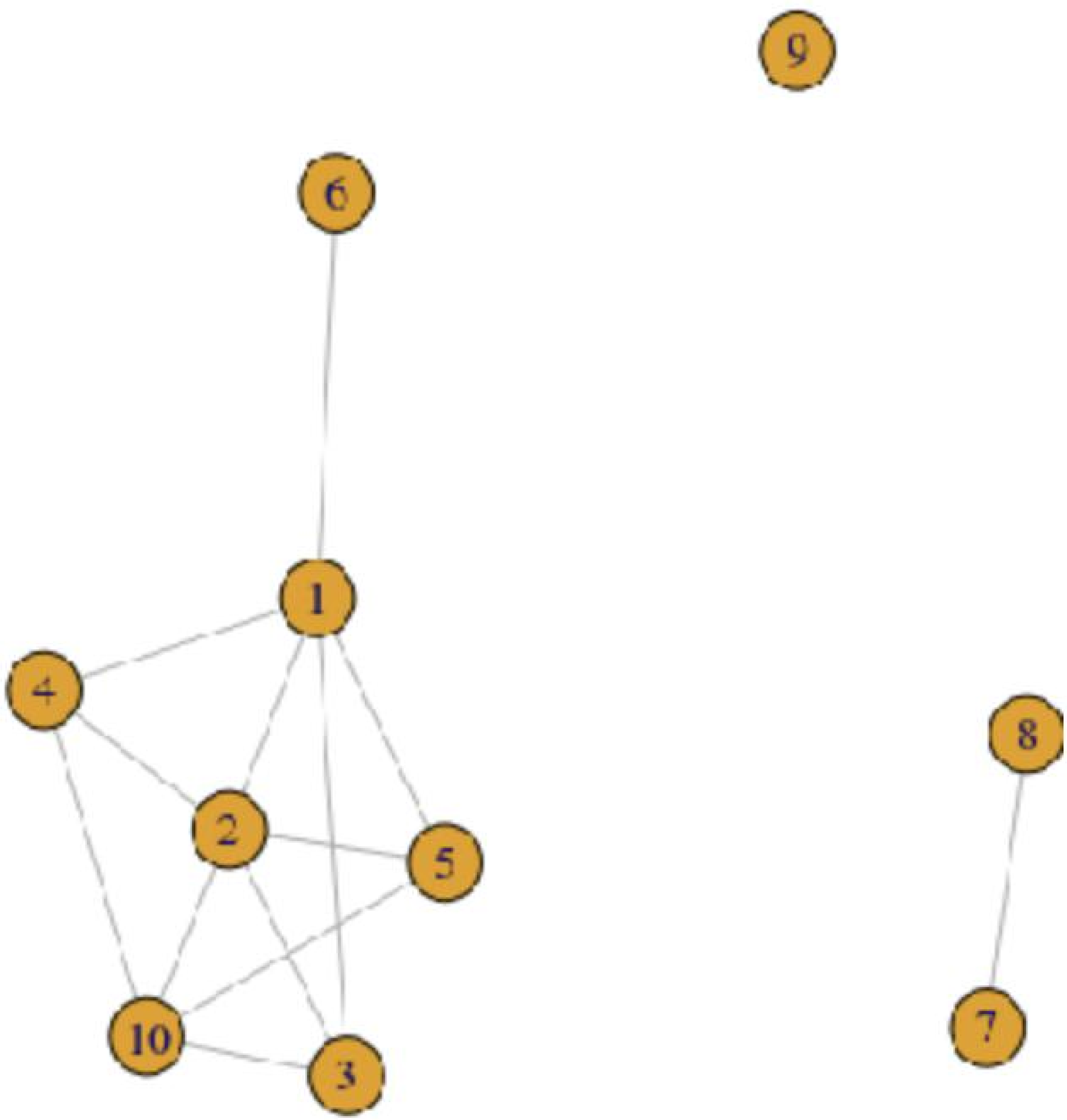
Question 12

The negation of $\forall x((x \geq o) \vee (x^2 \geq 0))$ is

- A. $\exists x((x \geq o) \wedge (x^2 \geq 0))$
- B. $\forall x((x < o) \wedge (x^2 < 0))$
- C. $\exists x((x < o) \vee (x^2 < 0))$
- D. $\exists x((x < o) \wedge (x^2 < 0))$

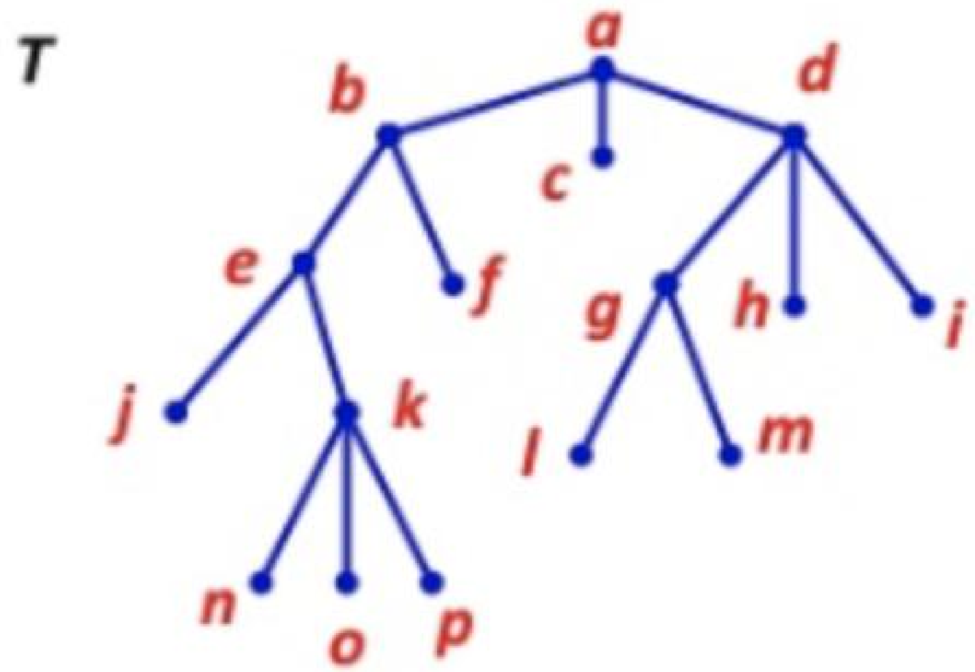
Question 13

How many components the graph has



- A. 3
- B. 2
- C. 1
- D. 4

Question 14

The hight of the rooted tree  is

- A. 5
- B. 6
- C. 3
- D. 4

Question 15

The number of regions a planar representation of $K_{2,4}$ determines in the plane is

- A. 2
- B. 3
- C. 4
- D. 1

Question 16

The Hasse digram 

represents the poset on {0,2,5,10,11,15} given by

- A. $\{(x,y): x \geq y\}$
- B. $\{(x,y): x \leq y\}$
- C. $\{(x,y): x \subseteq y\}$
- D. $\{(x,y): x \text{ divides } y\}$

Question 17

Let S={1,2,3,4} be a set and $\mathcal{P}(S)$ its power set. On $\mathcal{P}(S)$, define relation R as

$A\ R\ B \Leftrightarrow |A| = |B|$ (that is sets A and B have the same cardinality).

The equivalence class of $[\varnothing] =$

- A. $\{\varnothing\}$
- B. $\{\varnothing, S\}$
- C. $\{\varnothing, \{1\}, \{2\}, \{3\}, \{4\}\}$
- D. $\{\varnothing, \{1\}, \{1,2\}, \{1,2,3\}, S\}$

Question 18

The sum of product of $F(x,y,z) = (x+y)z$ *is*

A. $xyz + xy\bar{z} + \bar{x}yz$

B. $xyz + x\overline{yz} + x\bar{y}z + \bar{x}yz$

C. $xyz + x\bar{y}z + \bar{x}yz$

D. $xyz + xy\bar{z} + \bar{x}yz + \bar{x}\,\bar{y}\,\bar{z}$

Question 19

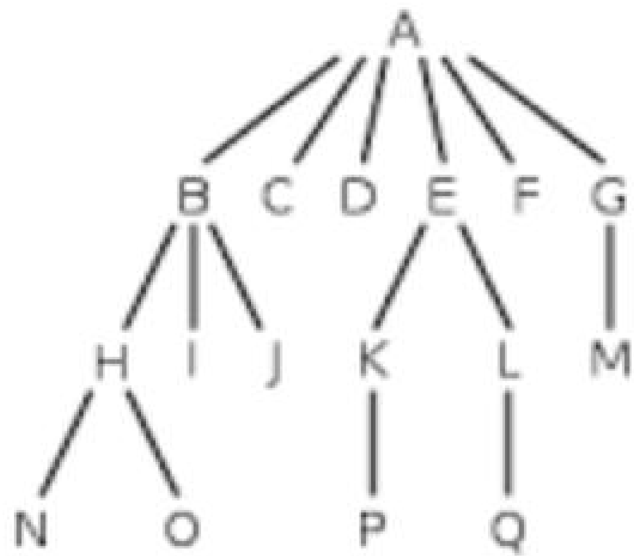
The argument

$$\begin{array}{l} \neg p \vee r \\ p \wedge q \\ p \\ \hline \therefore (p \wedge q) \to r \end{array}$$

is

- A. Undetermined
- B. Invalid
- C. Valid

Question 20

This rooted tree  is

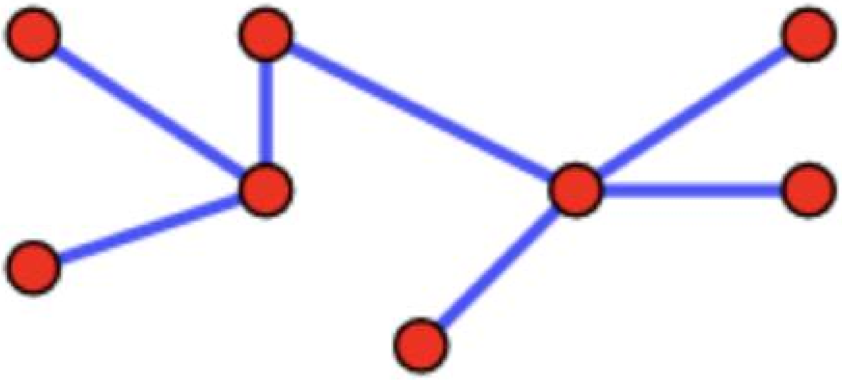
- A. 3-ary tree
- B. binary tree
- C. 4- ary tree
- D. 6- ary tree

Question 21

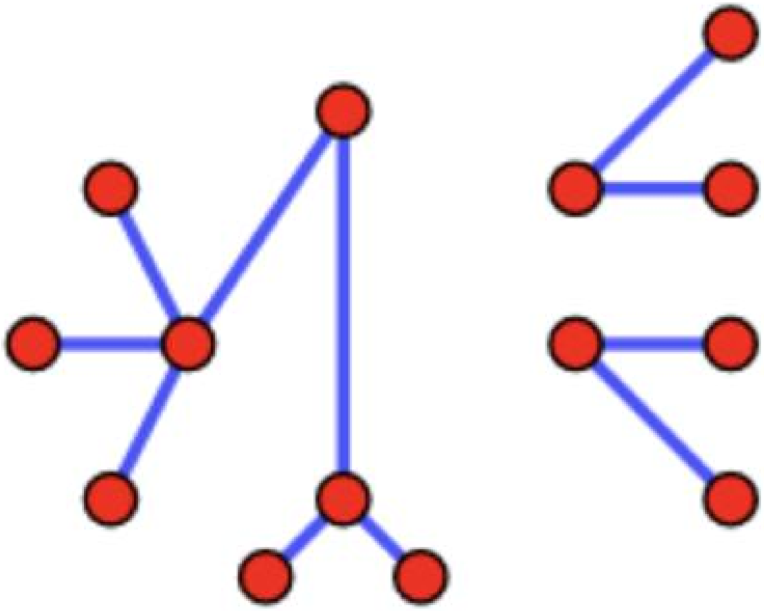
The value of the boolean variable x that satisfies the equation $x \cdot \overline{x} = 1$ is

- A. impossible
- B. x=1
- C. x=0

Question 22



This graph

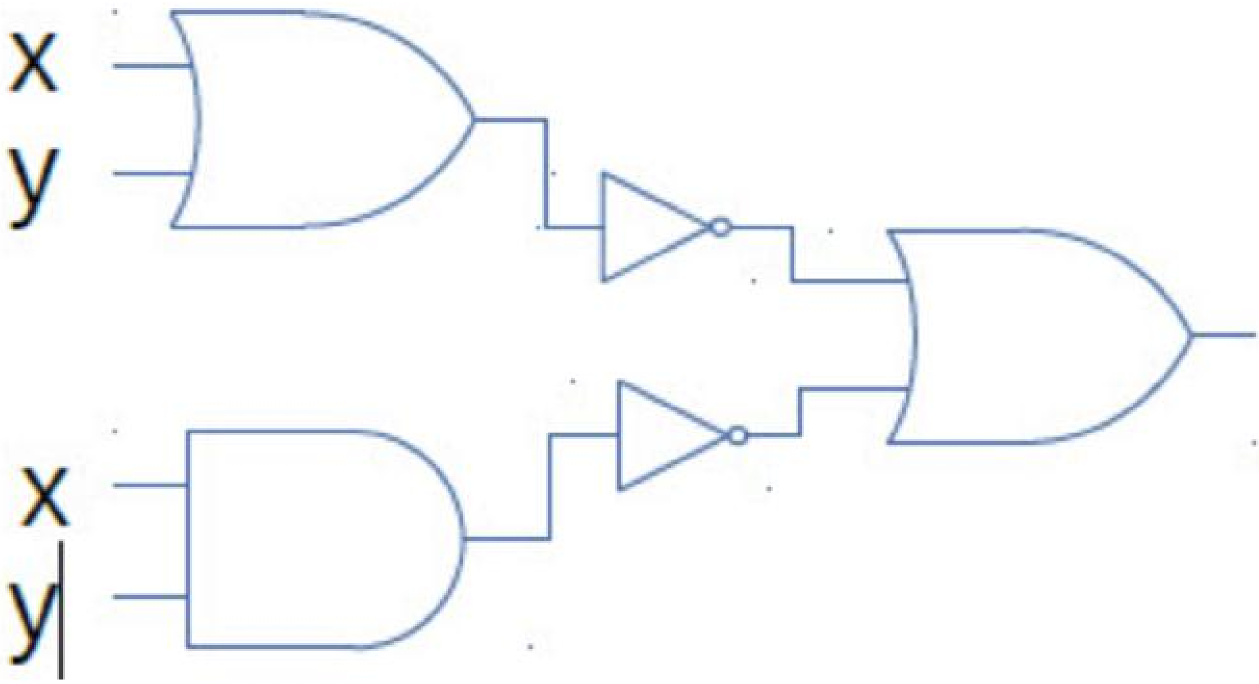


is

- A. complete graph
- B. cycle
- C. forest
- D. Tree

Question 23

The output of the given circuit is



- A. $\overline{(x+y)}+(xy)$
- B. $\overline{(x+y)}+\overline{(xy)}$
- C. $(x+y).(xy)$
- D. $\overline{(x+y)}.\overline{(xy)}$

Question 24

The simplify of the sum of product expansion given below using K-map is

	yz	$y\bar{z}$	$\bar{y}\,\bar{z}$	$\bar{y}\,z$
x	1	1		1
$\bar{x}$	1			1

- A. $x+\bar{x}\,z$
- B. $z+xy\bar{z}$
- C. $z+xy$
- D. $x\,y+\bar{y}\,z+\bar{x}\,y\,z$

Question 25

The relation $R = \{(x, y)\colon\ x + y = 0\}$ on the set of all real numbers is symmetric

- True
- False

Question 26

How many nonisomorphic graphs are there with three vertices?

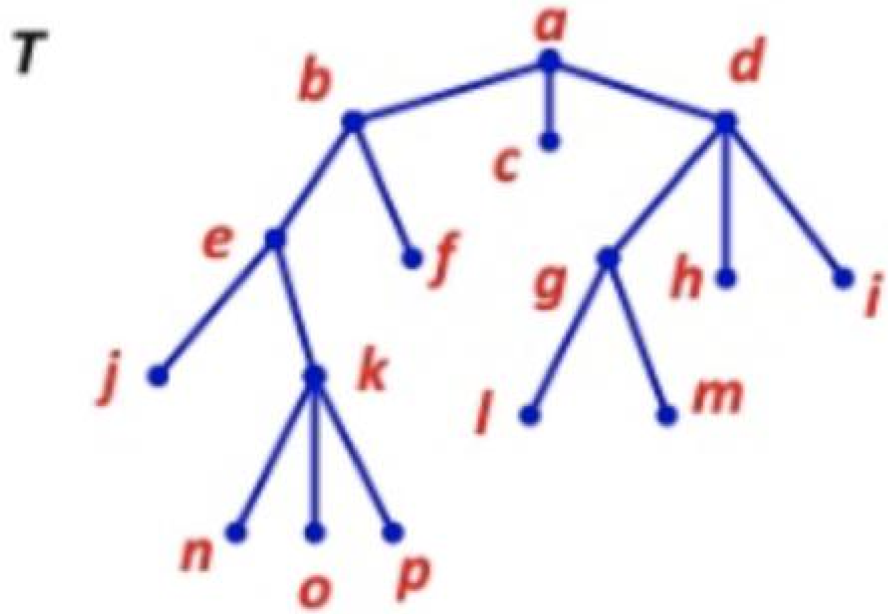
- A. 10
- B. 5
- C. 4
- D. 7

Question 29

The negation of a contingency is

- A. a contradiction
- B. a contingency
- C. a tautology

Question 31

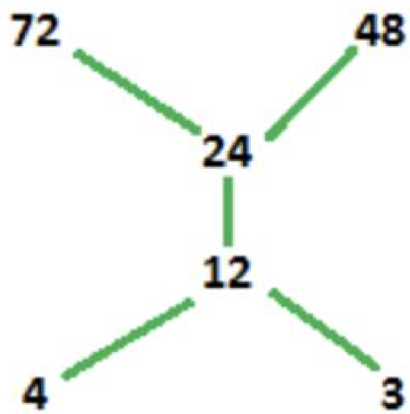
At the rooted tree 

what is the leaves ?

- c, f, h, i, j, l, m, n, o, p
- g, f
- j, l, m, i, k
- a, b, d, e, g, k

Question 1

The Hasse digram



represents the poset on {3,4,12,24,48,72} given by

- A. $\{(x,y): x \geq y\}$
- B. $\{(x,y): x \text{ divides } y\}$
- C. $\{(x,y): x \subseteq y\}$
- D. $\{(x,y): x \leq y\}$

Question 3

The number of regions a planar representation of $K_{2,3}$ determines in the plane is

- A. 1
- B. 4
- C. 3
- D. 2

Question 4

The value of the boolean variable x that satisfies the equation $x+x=0$ is

- A. impossible
- B. $x=0$
- C. $x=1$

Question 5

Which complete bipartite graph $K_{m,n}$ is a tree?

- A. $K_{2,2}$
- B. $K_{3,3}$
- C. $K_{2,3}$
- D. $K_{1,4}$

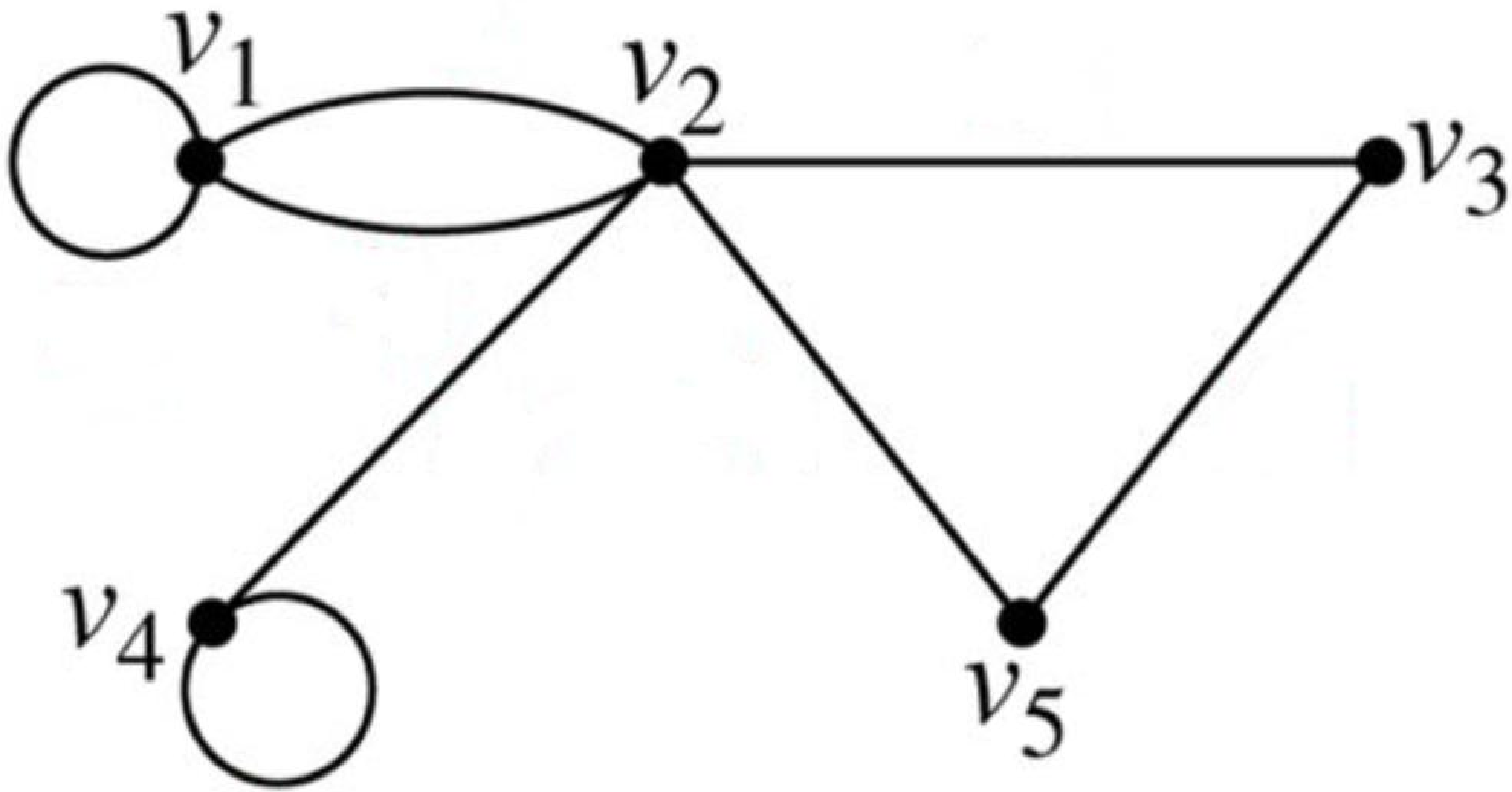
Question 6

The sum of product of $F(x,y,z) = (x+y)z$ *is*

- A. $xyz + xy\bar{z} + \bar{x}yz$
- B. $xyz + x\bar{y}z + \bar{x}yz$
- C. $xyz + xy\bar{z} + \bar{x}yz + \bar{x}\,\bar{y}\,\bar{z}$
- D. $xyz + x\overline{yz} + x\bar{y}z + \bar{x}yz$

Question 9

This graph

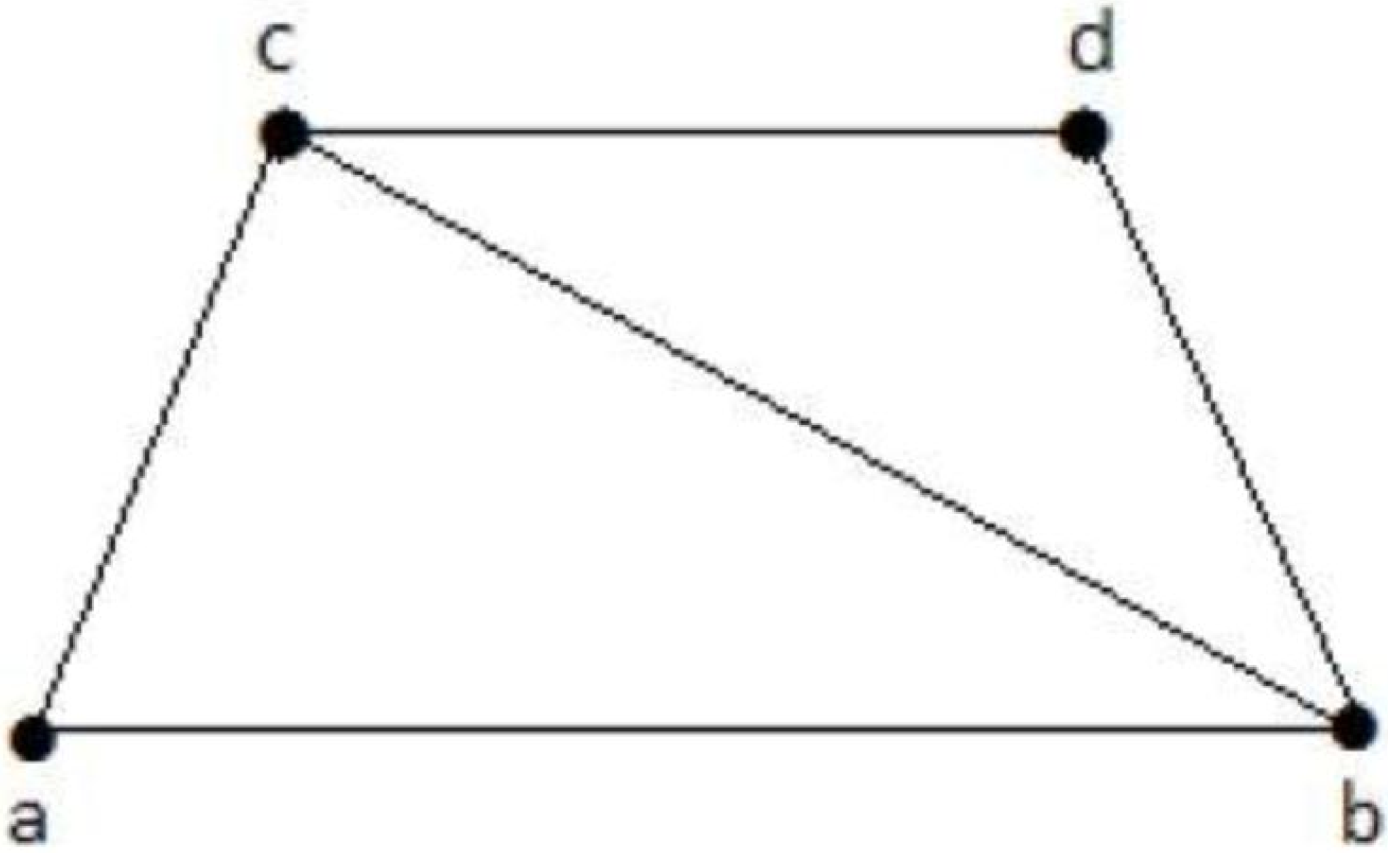


is

- A. Pesudograph
- B. mixed graph
- C. multigraph
- D. simple graph

Question 10

This graph



is bipartite

- [ ] True
- [x] False

Question 12

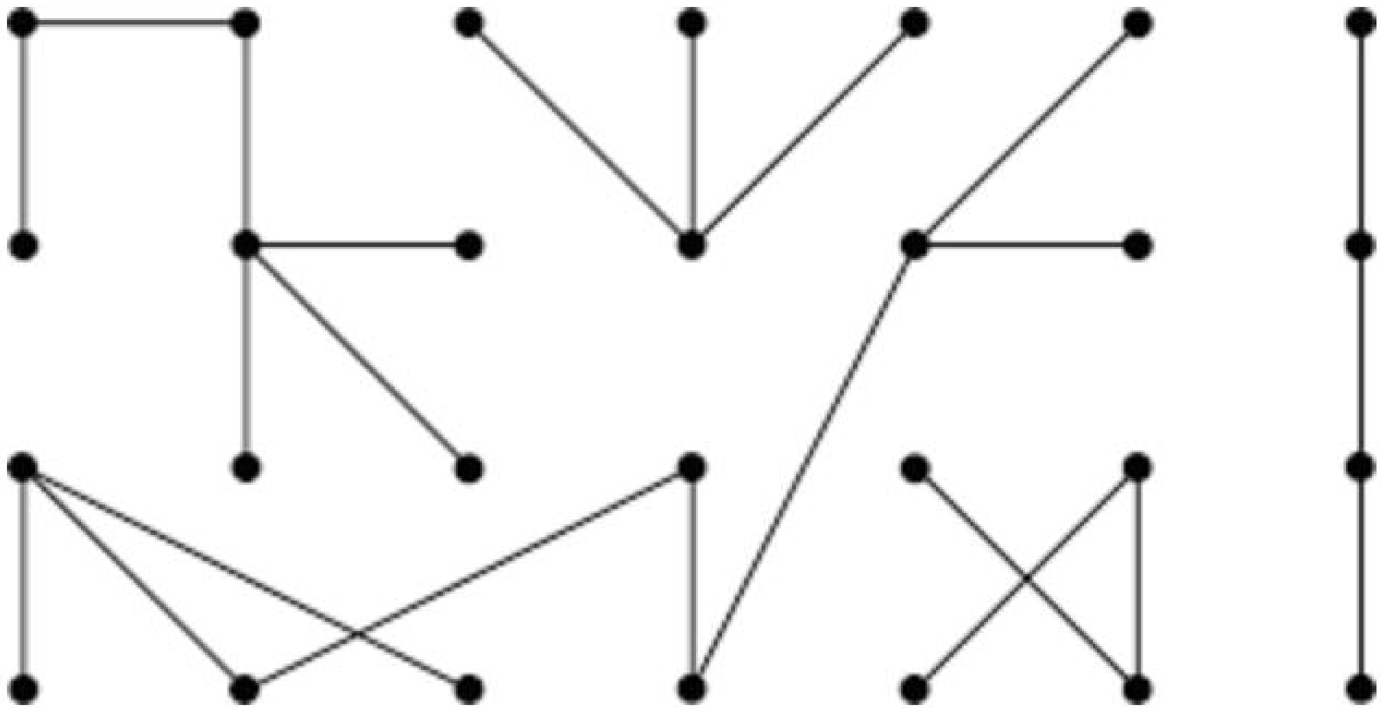
Let S={1,2,3,4} be a set and $\mathcal{P}(S)$ its power set. On $\mathcal{P}(S)$, define relation R as

$A\ R\ B \Leftrightarrow |A| = |B|$ (that is sets A and B have the same cardinality).

The equivalence class of $[\{1,2\}] =$

- A. $\{\{1,2\},\{1,3\},\{1,4\},\{2,3\},\{2,4\},\{3,4\}\}$
- B. $\{\{1,2\}\}$
- C. $\{\varnothing, S\}$
- D. $\{\{1\},\{2\},\{3\},\{4\}\}$

Question 13

This graph  is

- A. forest
- B. complete graph
- C. Tree
- D. cycle

Question 14

On $\mathbb{N}$, the relation $R = \{(a,b) : b = 2^k a, \text{ for some integer } k \geq 0\}$ is a total ordering on $\mathbb{N}$

- ○ True
- ● False