***ANSWERS MARKED IN BLUE/GREEN ARE CORRECT**

YELLOW=DOUBT*

A drawer contains 12 red and 12 blue socks, all unmatched. A person takes socks out at random in the dark. How many socks must he take out to be sure that he has at least two blue socks?
a) 18
b) 35
c) 28
d) 14

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The least number of computers required to connect 10 computers to 5 routers to guarantee 5 computers can directly access 5 routers is _____
a) 74
b) 104
c) 30
d) 67

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In a group of 267 people how many friends are there who have an identical number of friends in that group?
a) 266
b) 2
c) 138
d) 202

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When four coins are tossed simultaneously, in _____ number of the outcomes at most two of the coins will turn up as heads.
a) 17
b) 28
c) 11
d) 43

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How many numbers must be selected from the set {1, 2, 3, 4} to guarantee that at least one pair of these numbers add up to 7?
a) 14

b) 5
c) 9
d) 24

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During a month with 30 days, a cricket team plays at least one game a day, but no more than 45 games. There must be a period of some number of consecutive days during which the team must play exactly _____ number of games.
a) 17
b) 46
c) 124
d) 24

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In how many ways can 8 different dolls be packed in 5 identical gift boxes such that no box is empty if any of the boxes hold all of the toys?
a) 2351
b) 365
c) 2740
d) 1260

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A group of 20 girls plucked a total of 200 oranges. How many oranges can be plucked one of them?
a) 24
b) 10
c) 32
d) 7

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In a get-together party, every person present shakes the hand of every other person. If there were 90 handshakes in all, how many persons were present at the party?
a) 15
b) 14
c) 16
d) 17

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A bag contains 25 balls such as 10 balls are red, 7 are white and 8 are blue. What is the minimum number of balls that must be picked up from the bag blindfolded (without replacing any of it) to be assured of picking at least one ball of each colour?
a) 10
b) 18
c) 63
d) 35

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Which of the following is a correct representation of inclusion exclusion principle (|A,B| represents intersection of sets A,B)?
a) |A U B|=|A|+|B|-|A,B|
b) |A,B|=|A|+|B|-|A U B|
c) |A U B|=|A|+|B|+|A,B|
d) |A,B|=|A|+|B|+|A U B|

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_____ is one of the most useful principles of enumeration in combinationatorics and discrete probability.
a) Inclusion-exclusion principle
b) Quick search algorithm
c) Euclid's algorithm
d) Set theory

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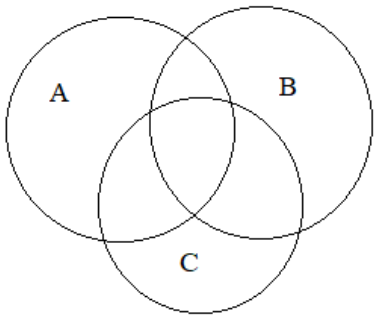
With reference to the given Venn diagram, what is the formula for computing |AUBUC| (where |x, y| represents intersection of sets x and y)?



a) |A U B U C|=|A|+|B|+|C|-|A,B|-|A,C|-|B,C|+|A, B,C|
b) |A, B,C|=|A|+|B|+|C|-|A U B|-|A U C|-|B U C|+|A U B U C|

c) |A, B,C|=|A|+|B|+|C|+|A,B|-|A,C|+|B,C|+|A U B U C|
d) |A U B U C|=|A|+|B|+|C| + |A,B| + |A,C| + |B,C|+|A, B,C|

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Using the inclusion-exclusion principle, find the number of integers from a set of 1-100 that are not divisible by 2, 3 and 5.
a) 22
b) 25
c) 26
d) 33

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Let A={1,2,3} B={2,3,4} C={1,3,5} D={2,3}. Find the cardinality of sum of all the sets.
a) 6
b) 5
c) 4
d) 7

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There are 70 patients admitted in a hospital in which 29 are diagnosed with typhoid, 32 with malaria, and 14 with both typhoid and malaria. Find the number of patients diagnosed with typhoid or malaria or both.
a) 39
b) 17
c) 47
d) 53

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At a software company, skilled workers have been hired for a project. Out of 75 candidates, 48 of them were software engineer; 35 of them were hardware engineer; 42 of them were network engineer; 18 of them had skills in all three jobs and all of them had skills in at least one of these jobs. How many candidates were hired who were skilled in exactly 2 jobs?
a) 69
b) 14
c) 32
d) 8

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The numbers between 1 and 520, including both, are divisible by 2 or 6 is _____

a) 349
b) 54
c) 213
d) 303

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In a renowned software development company of 240 computer programmers 102 employees are proficient in Java, 86 in C#, 126 in Python, 41 in C# and Java, 37 in Java and Python, 23 in C# and Python, and just 10 programmers are proficient in all three languages. How many computer programmers are there those are not proficient in any of these three languages?

a) 138
b) 17
c) 65
d) 49

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In class, students want to join sports. 15 people will join football, 24 people will join basketball, and 7 people will join both. How many people are there in the class?

a) 19
b) 82
c) 64
d) 30

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The sum of all integers from 1 to 520 that are multiples of 4 or 5?

a) 187
b) 208
c) 421
d) 52

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There are 9 letters having different colors (red, orange, yellow, green, blue, indigo, violet) and 4 boxes each of different shapes (tetrahedron, cube, polyhedron, dodecahedron). How many ways are there to place these 9 letters into the 4 boxes such that each box contains at least 1 letter?

a) 260100
b) 878760
c) 437102
d) 256850

..

A card is drawn randomly from a standard deck of cards. Determine the probability that the card drawn is a queen or a heart.
a) 1/4
b) 13/56
c) 4/13
d) 5/52

..

An integer from 300 through 780, inclusive is to be chosen at random. Find the probability that the number is chosen will have 1 as at least one digit.
a) 171/900
b) 43/860
c) 231/546
d) 31/701

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From 1, 2, 3, …, 320 one number is selected at random. Find the probability that it is either a multiple of 7 or a multiple of 3.
a) 72%
b) 42.5%
c) 12.8%
d) 63.8%

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The distance between x= 110110 and y=000101 is

a) 1
b) 2
c) 3
d) 4

..

The distance between x= 001100 and y=010110 is

a) 1
b) 2
c) 3
d) 4

..

An (m,n) coding function e: B^m □ B^n can detect k or less errors if and only if its minimum distance is at least _____

a) +k
b) -k
c) k+1 crrct ans
d) k-1

..

The weight of the words x= 00000 and y= 10100 are

a) 5 and 3
b) 5 and 2
c) 0 and 3
d) 0 and 2

..

The Hamming distance between x=101 and x=101 is

a) 0
b) 1
c) 2
d) 4

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In a (2,4) encoding function, the code words are e(00)=0000, e(01)= 1011, e(10)= 0110 and e(11)=1100, the number of errors that can be detected is _____

a) 3 and less errors
b) 1 and less errors (crrct ans)
c) 2 and less errors
d) 4 and less errors

..

Suppose there are 12 students, among whom are three students, M, B, C (a Math Major, a Biology Major, a Computer Science Major). We want to send a delegation of four students (chosen from the 12 students) to a convention. How many ways can this be done so that the delegation includes exactly two (not more, not less) students from {M, B, C}?

a) 32
b) 64
c) 88
d) 108

..

Teams A and B play in a basketball tournament. The first team to win two games in a row or a total of three games wins the tournament. What is the number of ways the tournament can occur?

(a) 8
(b) 9
(c) 10
(d) 11

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The number of four letter words that can be formed from the letters in BUBBLE (each letter occurring at most as many times as it occurs in BUBBLE) is

(a) 72
(b) 74
(c) 76
(d) 78

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The number of ways to seat 3 boys and 2 girls in a row if each boy must sit next to at least one girl is

(a) 36
(b) 48
(c) 148
(d) 184

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Suppose there are ten balls in an urn, four blue, four red, and two green. The balls are also numbered 1 to 10. How many ways are there to select an ordered sample of four balls without replacement such that there are two blue balls and two red balls in the sample?

(a) 144

(b) 256

(c) 446

(d) 864

..

How many different rearrangements are there of the letters in the word BUBBLE?

(a) 40

(b) 50

(c) 70

(d) 120

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How many different rearrangements are there of the letters in the word TATARS if the two A's are never adjacent?

(a) 24

(b) 120

(c) 144

(d) 180

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Suppose there are ten balls in an urn, four blue, four red, and two green. The balls are also numbered 1 to 10. How many ways are there to select an ordered sample of four balls without replacement such that the number $B \geq 0$ of blue balls, the number $R \geq 0$ of red balls, and the number $G \geq 0$ of green balls are all different?

(a) 256

(b) 864

(c) 1152

(d) 1446

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Suppose there are ten balls in an urn, four blue, four red, and two green. The balls are also numbered 1 to 10. You are asked to select an ordered sample of four balls without replacement. Let $B \geq 0$ be the number of blue balls, $R \geq 0$ be the number of red balls, and $G \geq 0$ be the number of green balls in your sample. How many ways are there to select such a sample if exactly one of B, R, or G must be zero?

(a) 256

(b) 1152

(c) 1446

(d) 2304

..

The number of partitions of X = {a, b, c, d} with a and b in the same block is

(a) 4

(b) 5

(c) 6

(d) 7

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Let Wab and Wac denote the set of partitions of X = {a, b, c, d, e} with a and b belonging to the same block and with a and c belonging to the same block, respectively. Similarly, let Wabc denote the set of partitions of X = {a, b, c, d, e} with a, b, and c belonging to the same block. What is |Wab ∪ Wac|? (Note: B(3) = 5, B(4) = 15, B(5) = 52, where B(n) is the number of partitions of an n-element set).

(a) 25

(b) 30

(c) 35

(d) 40

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The number of partitions of X = {a, b, c, d, e, f, g} with a, b, and c in the same block and c, d, and e in the same block is

(a) 2

(b) 5

(c) 10

(d) 15

..

Three boys and four girls sit in a row with all arrangements equally likely. Let x be the probability that no two boys sit next to each other. What is x?

(a) 1/7

(b) 2/7

(c) 3/7

(d) 4/7

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A man is dealt 4 spade cards from an ordinary deck of 52 cards. He is given 2 more cards. Let x be the probability that they both are the same suit. Which is true?

(a) $.2 < x \leq .3$

(b) $0 < x \leq .1$

(c) $.1 < x \leq .2$

(d) $.3 < x \leq .4$

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Six light bulbs are chosen at random from 15 bulbs of which 5 are defective. What is the probability that exactly one is defective?

(a) C(5, 1)C(10, 6)/C(15, 6)

(b) C(5, 1)C(10, 5)/C(15, 6)

(c) C(5, 1)C(10, 1)/C(15, 6)

(d) C(5, 0)C(10, 6)/C(15, 6)

..

A small deck of five cards are numbered 1 to 5. First one card and then a second card are selected at random, with replacement. What is the probability that the sum of the values on the cards is a prime number?

(a) 10/25

(b) 11/25

(c) 12/25

(d) 13/25

..

Let A and B be events with P(A) = 6/15, P(B) = 8/15, and $P((A \cup B)^c) = 3/15$. What is $P(A \cap B)$?

(a) 1/15

(b) 2/15 crrct ans

(c) 3/15

(d) 4/15

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Suppose the odds of A occurring are 1:2, the odds of B occurring are 5:4, and the odds of both A and B occurring are 1:8. The odds of $(A \cap B^c) \cup (B \cap A^c)$ occurring are

(a) 2:3

(b) 4:3

(c) 5:3

(d) 6:3 crrct ans

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A pair of fair dice is tossed. Find the probability that the greatest common divisor of the two numbers is one.

(a) 12/36

(b) 15/36

(c) 17/36

(d) 23/36 ccrct ans

..

Three boys and three girls sit in a row. Find the probability that exactly two of the girls are sitting next to each other (the remaining girl separated from them by at least one boy).

(a) 4/20

(b) 6/20

(c) 10/20

(d) 12/20 crrct ans

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A man is dealt 4 spade cards from an ordinary deck of 52 cards. If he is given five more, what is the probability that none of them are spades?

(a) $\binom{39}{1}/\binom{48}{5}$ (b) $\binom{39}{2}/\binom{48}{5}$ (c) $\binom{39}{3}/\binom{48}{5}$ (d) $\binom{39}{5}/\binom{48}{5}$

ans D

How do we find the number of items in *neither* of two sets?

a) Find the number of items in the intersection of the two sets and subtract from the number of items in the universe.

b) ans: Find the number of items in the union of the two sets and subtract from the number of items in the universe.

c) Add the number of items in each of the two sets and subtract from the number of items in the universe.

d) Add the number of items in each of the two sets and also the intersection of the two sets and subtract from the number of items in the universe.

..

Consider the recurrence relation $a_1=4$, $a_n=5n+a_{n-1}$. The value of a_{64} is

_____

a) 10399

b) 23760

c) 75100
d) 53700

..

Determine the solution of the recurrence relation $F_n=20F_{n-1} - 25F_{n-2}$ where $F_0=4$ and $F_1=14$.
a) $a_n = 14*5^{n-1}$
b) $a_n = 7/2*2^n−1/2*6^n$
c) $a_n = 7/2*2^n −3/4*6^{n+1}$
d) $a_n = 3*2^n −1/2*3^n$

..

What is the recurrence relation for 1, 7, 31, 127, 499?
a) $b_{n+1}=5b_{n-1}+3$
b) $b_n=4b_n+7!$
c) $b_n=4b_{n-1}+3$
d) $b_n=b_{n-1}+1$

..

If $S_n=4S_{n-1}+12n$, where $S_0=6$ and $S_1=7$, find the solution for the recurrence relation.
a) $a_n=7(2^n)−29/6n6^n$
b) $a_n=6(6^n)+6/7n6^n$
c) $a_n=6(3^{n+1})−5n$
d) $a_n=nn−2/6n6^n$

..

Find the value of a_4 for the recurrence relation $a_n=2a_{n-1}+3$, with $a_0=6$.
a) 320
b) 221
c) 141
d) 65

..

The solution to the recurrence relation $a_n=a_{n-1}+2n$, with initial term $a_0=2$ are
_____
a) 4n+7
b) 2(1+n)
c) $3n^2$
d) 5*(n+1)/2

..

Determine the solution for the recurrence relation $b_n=8b_{n-1}-12b_{n-2}$ with $b_0=3$ and $b_1=4$.

a) $7/2*2^n-1/2*6^n$

b) $2/3*7^n-5*4^n$

c) $4!*6^n$

d) $2/8^n$

..

What is the solution to the recurrence relation $a_n=5a_{n-1}+6a_{n-2}$?

a) $2n^2$

b) 6n

c) (3/2)n

d) n!*3

..

Determine the value of a2 for the recurrence relation $a_n = 17a_{n-1} + 30n$ with $a_0=3$.

a) 4387

b) 5484

c) 238

d) 1437

..

Determine the solution for the recurrence relation $a_n = 6a_{n-1}-8a_{n-2}$ provided initial conditions $a_0=3$ and $a_1=5$.

a) $a_n = 4 * 2^n – 3^n$

b) $a_n = 3 * 7^n – 5*3^n$

c) $a_n = 5 * 7^n$

d) $a_n = 3! * 5^n$

..

What is the generating function for the sequence 1, 6, 16, 216,….?

a) (1+6x)/x3

b) $1/(1-6x)$

c) $1/(1-4x)$

d) $1-6x^2$

..

What is the generating function for generating series 1, 2, 3, 4, 5,… ?
a) 2/(1−3x)
b) 1/(1+x)
c) 1/(1−x)2
d) 1/(1−x2)

..

What is the generating function for the generating sequence A = 1, 9, 25, 49,…?
a) $1+(A-x^2)$
b) (1-A)-1/x
c) $(1-A)+1/x^2$
d) $(A-x)/x^3$

..

What is the recurrence relation for the sequence 1, 3, 7, 15, 31, 63,…?
a) $a_n = 3a_{n-1}-2a_{n+2}$
b) $a_n = 3a_{n-1}-2a_{n-2}$
c) $a_n = 3a_{n-1}-2a_{n-1}$
d) $a_n = 3a_{n-1}-2a_{n-3}$

..

What will be the sequence generated by the generating function $4x/(1-x)^2$?
a) 12, 16, 20, 24,…
b) 1, 3, 5, 7, 9,…
c) 0, 4, 8, 12, 16, 20,…
d) 0, 1, 1, 3, 5, 8, 13,…

..

What is the generating function for the sequence with closed formula $a_n=4(7^n)+6(-2)^n$?
a) (4/1−7x)+6!
b) (3/1−8x)
c) (4/1−7x)+(6/1+2x)
d) (6/1-2x)+8

..

Suppose G is the generating function for the sequence 4, 7, 10, 13, 16, 19,…, the find a generating function (in terms of G) for the sequence of differences between terms.

a) $(1-x)G-4/x$
b) $(1-x)G-4/x^3$
c) $(1-x)G+6/x$
d) $(1-x)G-x^2$

..

Find the sequence generated by $1/1-x^2-x^4$.,assume that 1, 1, 2, 3, 5, 8,… has generating function $1/1-x-x^2$.
a) 0, 0, 1, 1, 2, 3, 5, 8,…
b) 0, 1, 2, 3, 5, 8,…
c) 1, 1, 2, 2, 4, 6, 8,…
d) 1, 4, 3, 5, 7,…

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The third term of a geometric progression with common ratio equal to half the initial term is 81. Determine the 12^{th} term.
a) 3^{12}
b) 4^{15}
c) 6^8
d) 5^9

..

The explicit formula for the geometric sequence 3, 15, 75, 375,… is _____
a) $2*6! * 3^{n-1}$
b) $3 * 5^{n-1}$
c) $3! * 8^{n-1}$
d) $7 * 4^{n-1}$

..

A non empty set A is termed as an algebraic structure _____
a) with respect to binary operation *
b) with respect to ternary operation ?
c) with respect to binary operation +
d) with respect to unary operation –

..

An algebraic structure _____ is called a semigroup.
a) (P, *)
b) (Q, +, *)

c) (P, +)
d) (+, *)

..

Condition for monoid is _____
a) (a+e)=a
b) (a*e)=(a+e)
c) a=(a*(a+e)
d) (a*e)=(e*a)=a

..

A monoid is called a group if _____
a) (a*a)=a=(a+c)
b) (a*c)=(a+c)
c) (a+c)=a
d) (a*c)=(c*a)=e

..

A group (M,*) is said to be abelian if _____
a) (x+y)=(y+x)
b) (x*y)=(y*x)
c) (x+y)=x
d) (y*x)=(x+y)

..

Matrix multiplication is a/an _____ property.
a) Commutative
b) Associative
c) Additive
d) Disjunctive

..

A cyclic group can be generated by a/an _____ element.
a) singular
b) non-singular
c) inverse
d) multiplicative

..

How many properties can be held by a group?
a) 2
b) 3
c) 5
d) 4

..

A cyclic group is always _____
a) abelian group
b) monoid
c) semigroup
d) subgroup

..

{1, i, -i, -1} is _____
a) semigroup
b) subgroup
c) cyclic group
d) abelian group

..

_____ are called group postulates.
a) Group lemmas
b) Group theories
c) Group axioms
d) Group

..

A subgroup has the properties of _____
a) Closure, associative
b) Commutative, associative, closure
c) Inverse, identity, associative
d) Closure, associative, Identity, Inverse

..

If a * b = a such that a ∗ (b ∗ c) = a ∗ b = a and (a * b) * c = a * b = a then _____
a) * is associative
b) * is commutative

c) * is closure
d) * is abelian

..

The set of odd and even positive integers closed under multiplication is _____

a) a free semigroup of (M, ×)
b) a subsemigroup of (M, ×)
c) a semigroup of (M, ×)
d) a subgroup of (M, ×)

..

If F is a free semigroup on a set S, then the concatenation of two even words is _____

a) a semigroup of F
b) a subgroup of F
c) monoid of F
d) cyclic group of F

..

The set of rational numbers form an abelian group under _____

a) Association
b) Closure
c) Multiplication
d) Addition

..

Condition of semigroup homomorphism should be _____

a) f(x * x) = f(x * y)
b) f(x) = f(y)
c) f(x) * f(y) = f(y)
d) f(x * y) = f(x) * f(y)

..

A function f:(M,∗)→(N,×) is a homomorphism if _____

a) f(a, b) = a*b
b) f(a, b) = a/b
c) f(a, b) = f(a)+f(b)
d) f(a, b) = f(a)*f(a)

..

A function defined by f(x)=2*x such that f(x+y)=2x+y under the group of real numbers, then _____
a) Isomorphism exists
b) Homomorphism exists
c) Heteromorphic exists
d) Association exists

..

If x * y = x + y + xy then (G, *) is _____
a) Monoid
b) Abelian group
c) Commutative semigroup
d) Cyclic group

..

Let $(A_7, \otimes_7)=(\{1, 2, 3, 4, 5, 6\}, \otimes_7)$ is a group. It has two sub groups X and Y. X={1, 3, 6}, Y={2, 3, 5}. What is the order of union of subgroups?
a) 65
b) 5
c) 32
d) 18

..

A relation (34 × 78) × 57 = 57 × (78 × 34) can have _____ property.
a) distributive
b) associative
c) commutative
d) closure

..

B_1: ({0, 1, 2….(n-1)}, x_m) where x_n stands for “multiplication-modulo-n” and B_2: ({0, 1, 2….n}, x_n) where x_n stands for “multiplication-modulo-m” are the two statements. Both B_1 and B_2 are considered to be _____
a) groups
b) semigroups
c) subgroups
d) associative subgroup

..

If group G has 65 elements and it has two subgroups namely K and L with order 14 and 30. What can be order of K intersection L?
a) 10
b) 42
c) 5
d) 35

..

Consider the binary operations on X, a*b = a+b+4, for a, b ∈ X. It satisfies the properties of _____
a) abelian group
b) semigroup
c) multiplicative group
d) isomorphic group

..

Let * be the binary operation on the rational number given by a*b=a+b+ab. Which of the following property does not exist for the group?
a) closure property
b) identity property
c) symmetric property
d) associative property

..

Let G be a finite group with two sub groups M & N such that |M|=56 and |N|=123. Determine the value of |M⋂N|.
a) 1
b) 56
c) 14
d) 78

..

A group G, ({0}, +) under addition operation satisfies which of the following properties?
a) identity, multiplicity and inverse
b) closure, associativity, inverse and identity
c) multiplicity, associativity and closure
d) inverse and closure

..

If (M, *) is a cyclic group of order 73, then number of generator of G is equal to _____

a) 89
b) 23
c) 72
d) 17

..

The set of even natural numbers, {6, 8, 10, 12,..,} is closed under addition operation. Which of the following properties it will not satisfy?

a) closure property
b) associative property
c) commutative property
d) identity property

..

In a group there must be _____ number of identity element/elements.

a) 1
b) 2
c) 3
d) 5

..

_____ is the multiplicative identity of natural numbers.

a) 0
b) -1
c) 1
d) 2

..

An identity element of a group has _____ element.

a) associative
b) commutative
c) inverse
d) homomorphic

..

_____ matrices do not have multiplicative inverses.

a) non-singular
b) singular

c) triangular
d) inverse

..

If X is an idempotent nonsingular matrix, then X must be _____
a) singular matrix
b) identity matrix
c) idempotent matrix
d) nonsingular matrix

..

If A, B, and C are invertible matrices, the expression $(AB^{-1})^{-1}(CA^{-1})^{-1}C2$ evaluates to _____
a) BC
b) $C^{-1}BC$
c) AB^{-1}
d) $C^{-1}B$

..

If the sum of elements in each row of an n×n matrix Z is zero, then the matrix is _____
a) inverse
b) non-singular
c) additive inverse
d) singular

..

_____ are the symmetry groups used in the Standard model.
a) lie groups
b) subgroups
c) cyclic groups
d) poincare groups

..

A semigroup S under binary operation * that has an identity is called _____
a) multiplicative identity
b) monoid
c) subgroup
d) homomorphism

..

An element a in a monoid is called an idempotent if _____

a) $a^{-1}=a*a^{-1}$

b) $a*a^{2}=a$

c) $a^{2}=a*a=a$

d) $a^{3}=a*a$

..

Let K be a group with 8 elements. Let H be a subgroup of K and H<K. It is known that the size of H is at least 3. The size of K is _____

a) 8

b) 2

c) 3

d) 4

..

_____ is not necessarily a property of a Group.

a) Commutativity

b) Existence of inverse for every element

c) Existence of Identity

d) Associativity

..

Intersection of subgroups is a _____

a) group

b) subgroup

c) semigroup

d) cyclic group

..

The group of matrices with determinant _____ is a subgroup of the group of invertible matrices under multiplication.

a) 2

b) 3

c) 1

d) 4

..

An isomorphism of a group onto itself is called _____

a) homomorphism

b) heteromorphism
c) epimorphism
d) automorphism

..

Every cyclic group is a/an _____
a) infinite subgroup
b) abelian group
c) monoid
d) commutative semigroup

..

Consider the congruence 45≡3(mod 7). Find the set of equivalence class representatives.
a) {…, 0, 7, 14, 28, …}
b) {…, -3, 0, 6, 21, …}
c) {…, 0, 4, 8, 16, …}
d) {…, 3, 8, 15, 21, …}

..

Suppose a relation R = {(3, 3), (5, 5), (5, 3), (5, 5), (6, 6)} on S = {3, 5, 6}. Here R is known as _____
a) equivalence relation
b) reflexive relation
c) symmetric relation
d) transitive relation

..

Determine the number of equivalence classes that can be described by the set {2, 4, 5}.
a) 125
b) 5
c) 16
d) 72

..

For a, b ∈ Z define a | b to mean that a divides b is a relation which does not satisfy _____
a) irreflexive and symmetric relation
b) reflexive relation and symmetric relation

c) transitive relation
d) symmetric relation

..

Which among the following is not an essential property of a ring
a) Distributive Law
b) no zero divisors
c) Associativity of multiplication
d) Closure under multiplication (Crrct)

..

A Ring is said to be commutative if it also satisfies the property
a) No zero divisors
b) Multiplicative Identity
c) Multiplicative Inverse
ANS d) Commutativity of multiplication (crct)

..

A bridge cannot be a part of _____
a) a simple cycle
b) a tree
c) a clique with size ≥ 3 whose every edge is a bridge
d) a graph which contains cycles

..

A graph G consists of _____.

(A) a set of nodes
(B) a set of edges
(C) a mapping from set of edges to set of order pairs of nodes
(D) all of these

..

Which of the following is incorrect?

(A) If two nodes u and v are joined by an edge e then u and v are said to be adjacent nodes.
(B) If two nodes of a graph are joined by more than one edge then these edges are called distinct edges.
(C) An edge e of a graph G that joins a node u to itself is called a loop.
(D) A graph in which every edge is directed is called a directed graph.

..

If some edges of a graph G are directed and some are undirected then G is said to be _____.

(A) mixed graph
(B) multi graph
(C) simple graph
(D) null graph

..

Any graph which contains some parallel edges is called a _____.

(A) simple graph
(B) mixed graph
(C) multi graph
(D) null graph

..

A graph which has neither loop nor parallel edges is called a _____ graph.

(A) simple
(B) mixed
(C) multi
(D) null

..

In a graph a node which is not adjacent to any other node is called _____ node.

(A) an initiating wrong
(B) a simple
(C) a different
(D) an isolated (ans)

..

Two graphs are isomorphic if _____.

Commented [1]: blue bhi correct h !

(A) both has same number of nodes
(B) both has same number of edges incorrct
(C) A and B only
(D) none of these (ans)

..

The number of nodes in a graph G is called _____ of the graph G.

(A) size
(B) degree

(C) order
(D) weight

..

The number of edges in a graph G is called _____ of the graph G.

(A) size
(B) degree
(C) order
(D) weight
..

The indegree of a node v is denoted by _____.

(A) d+(v)
(B) d-(v)
(C) d(v)
(D) D(v)
..

For any directed graph G, _____.

(A) d(v)=2d+(v)
(B) d(v)=2d-(v)
(C) d(v)=d+(v)+d-(v)
(D) d(v)=d+(v)-d-(v)
..

The total degree of an isolated node is _____.

(A) 0
(B) 1
(C) 2
(D) none of these
..

Which of the following is incorrect?

(A) $\sum_{i=1}^{n} d^{+}(v_i) = e$
(B) $\sum_{i=1}^{n} d^{-}(v_i) = e$
(C) $\sum_{i=1}^{n} d(v_i) = e$
(D) $\sum_{i=1}^{n} d(v_i) = 2e$

c

..

Which of the following is incorrect?

(A) Graph is also a subgraph of itself.
(B) Null graph is a subgraph of given graph.
(C) Converse of a digraph is also a subgraph of given graph.
(D) none

..

The length of a path is dependent on _____.

(A) edges of a path
(B) nodes of a path
(C) direction of a path
(D) degree of nodes of path

..

Which of the following is incorrect?

(A) The number of edges appearing in the sequence of a path is called the length of the path.
(B) Every elementary path of a digraph is also a simple path.
(C) A path which originates and ends with the same node is called a cycle.
(D) Every simple path of a digraph is also a elementary path.

A simple diagrpah with condition_____ such that it is acyclic graph.

(A) it does not contain any loop
(B) it does not contain any cycle (ans)
(C) it contain a loop
(D) it contain a cycle

..

Reachability is _____ relation. (1). reflexive (2). symmetric (3). transitive (4). anti symmetric

(A) 1 & 2
(B) 1 & 3
(C) 3 & 4
(D) 2 & 4

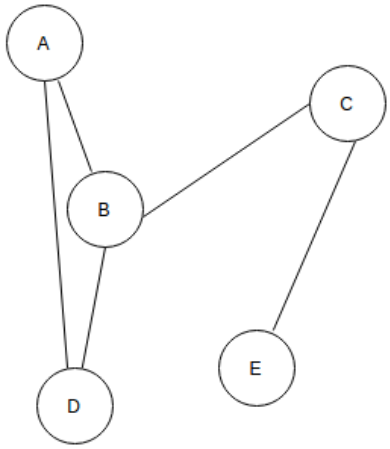
..

The sum of each elements in the row of adjacency matrix indicates _____ of the corresponding node.

(A) indegree
(B) outdegree
(C) total degree
(D) diameter of graph
..

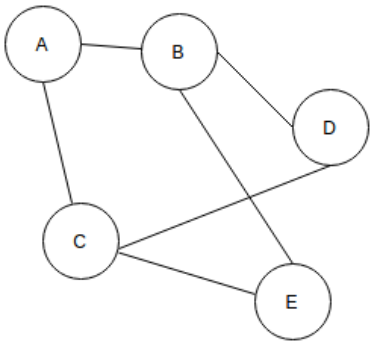
Which of the following statements for a simple graph is correct?
a) Every path is a trail
b) Every trail is a path
c) Every trail is a path as well as every path is a trail
d) Path and trail have no relation
..

In the given graph identify the cut vertices.



a) B and E
b) C and D
c) A and E
d) C and B
..

For the given graph(G), which of the following statements is true?



a) G is a complete graph
b) G is not a connected graph
c) The vertex connectivity of the graph is 2
d) The edge connectivity of the graph is 1

..

What is the number of edges present in a complete graph having n vertices?
a) (n*(n+1))/2
b) (n*(n-1))/2
c) n
d) Information given is insufficient

..

A connected planar graph having 6 vertices, 7 edges contains _____ regions.
a) 15
b) 3
c) 1
d) 11

..

If a simple graph G, contains n vertices and m edges, the number of edges in the Graph G'(Complement of G) is _____
a) (n*n-n-2*m)/2
b) (n*n+n+2*m)/2
c) (n*n-n-2*m)/2
d) (n*n-n+2*m)/2

..

Which of the following properties does a simple graph not hold?
a) Must be connected

b) Must be unweighted
c) Must have no loops or multiple edges
d) Must have no multiple edges
..

What is the maximum number of edges in a bipartite graph having 10 vertices?
a) 24
b) 21
c) 25
d) 16
..

Which of the following is true?
a) A graph may contain no edges and many vertices
b) A graph may contain many edges and no vertices (ans)
c) A graph may contain no edges and no vertices
d) A graph may contain no vertices and many edges
..

For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true?
a) v=e
b) v = e+1
c) v + 1 = e
d) v = e-1
..

For which of the following combinations of the degrees of vertices would the connected graph be eulerian?
a) 1,2,3
b) 2,3,4
c) 2,4,5
d) 1,3,5
..

A graph with all vertices having equal degree is known as a _____
a) Multi Graph
b) Regular Graph
c) Simple Graph
d) Complete Graph
..

Which of the following ways can be used to represent a graph?
a) Adjacency List and Adjacency Matrix
b) Incidence Matrix
c) Adjacency List, Adjacency Matrix as well as Incidence Matrix
d) No way to represent
..

The number of elements in the adjacency matrix of a graph having 7 vertices is _____
a) 7
b) 14
c) 36
d) 49
..

For the adjacency matrix of a directed graph the row sum is the _____ degree and the column sum is the _____ degree.
a) in, out
b) out, in
c) in, total
d) total, out
..

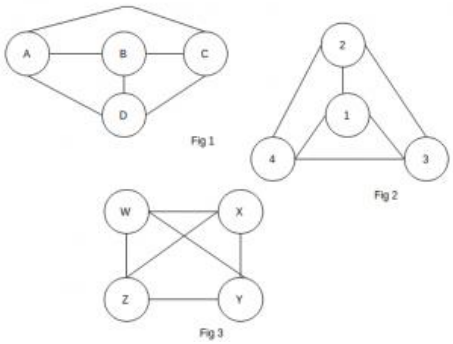
What is the maximum number of possible non zero values in an adjacency matrix of a simple graph with n vertices?
a) (n*(n-1))/2
b) (n*(n+1))/2
c) n*(n-1)
d) n*(n+1)
..

Which of these adjacency matrices represents a simple graph?
a) [[1, 0, 0], [0, 1, 0], [0, 1, 1]]

b) [[1, 1, 1], [1, 1, 1], [1, 1, 1]]
c) [[0, 0, 1], [0, 0, 0], [0, 0, 1]]

d) [[0, 0, 1], [1, 0, 1], [1, 0, 0]]
..

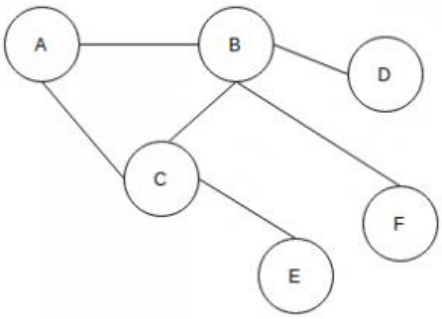
Which of the following graphs are isomorphic to each other?



a) fig 1 and fig 2
b) fig 2 and fig 3
c) fig 1 and fig 3
d) fig 1, fig 2 and fig 3 (ans)

..

In the given graph which edge should be removed to make it a Bipartite Graph?



a) A-C
b) B-E
c) C-D
d) D-E

..

G is a simple undirected graph and some vertices of G are of odd degree. Add a node n to G and make it adjacent to each odd degree vertex of G. The resultant graph is _____
a) Complete bipartite graph
b) Hamiltonian cycle

c) Regular graph
d) Euler graph

..

The minimum number of edges in a connected cyclic graph on n vertices is _____

a) n – 1
b) n (ans)
c) 2n+3
d) n+1

..

The _____ of a graph G consists of all vertices and edges of G.
a) edge graph
b) line graph
c) path complement graph
d) eulerian circuit

..

A _____ in a graph G is a circuit which consists of every vertex (except first/last vertex) of G exactly once.
a) Euler path
b) Hamiltonian path
c) Planar graph
d) Path complement graph

..

A walk has Closed property if _____

a) $v_0=v_k$
b) $v_0>=v_k$
c) $v < 0$
d) $v_k > 1$

..

The sum of an n-node graph and its complement graph produces a graph called _____

a) complete graph
b) bipartite graph
c) star graph
d) path-complement graph

..

The chromatic number of a graph is the property of _____
a) graph coloring
b) graph ordering
c) group ordering
d) group coloring

..

If a graph G is k-colorable and k<n, for any integer n then it is _____
a) n-colorable
b) n^2 nodes
c) (k+n)-colorable
d) (k^3+n^3+1) nodes

..

For a connected planar simple graph G=(V, E) with e=|E|=16 and v=|V|=9, then find the number of regions that are created when drawing a planar representation of the graph?
a) 321
b) 9
c) 1024
d) 596

..

A non-planar graph can have _____
a) complete graph
b) subgraph
c) line graph
d) bar graph

..

Determine the density of a planar graph with 34 edges and 13 nodes.
a) 22/21
b) 12/23
c) 328
d) 576

..