MTH301 Final term Solved Subjective

Question: What does it mean by the preservation of edge end point function in the definition of isomorphism of graphs?

Answer: Since you know that we are looking for two functions (Suppose one function is "f" and other function is "g") which preserve the edge end point function and this preservation means that if we have vi as an end point of the edge ej then f(vi) must be an end point of the edge g(ej) and also the converse that is if f(vi) be an end point of the edge g(ej) then we must have vi as an end point of the edge ej. Note that vi and ej are the vertex and edge of one graph respectively where as f (vi) and g (ej) are the vertex and edge in the other graph respectively.

Question: Is there any method of identifying that the given graphs are isomorphic or not?(With out finding out two functions).

Answer: Unfortunately there is no such method which will identify whether the given graphs are isomorphic or not. In order to find out whether the two given graphs are isomorphic first we have to find out all the bijective mappings from the set vertices of one graph to the set of vertices of the other graph then find out all the bijective functions from the set of edges of one graph to the set of edges of the other graph. Then see which mappings preserve the edge end point function as defined in the definition of Isomorphism of graphs. But it is easy to identify that the two graphs are not isomorphic. First of all note that if there is any Isomorphic Invariant not satisfied by both the graphs, then we will say that the graphs are not Isomorphic. Note that if all the isomorphic Invariants are satisfied by two graphs then we can't conclude that the graphs are isomorphic. In order to prove that the graphs are isomorphic we have to find out two functions which satisfied the condition as defined in the definition of Isomorphism of graphs.

Question: What are Complementary Graphs?

Answer: Complementary Graph of a simple graph(G) is denoted by the (G bar) and has as many vertices as G but two vertices are adjacent in complementary Graph by an edge if and only if these two vertices are not adjacent in G .

Question: What is the application of isomorphism in real word?

Answer: There are many applications of the graph theory in computer Science as well as in the Practical life; some of them are given below. (1) Now you also go through the puzzles like that we have to go through these points without lifting the pencil and without repeating our path. These puzzles can be solved by the Euler and Hamiltonian circuits. (2) Graph theory as well as Trees has applications in "DATA STRUCTURE" in which you will use trees, especially binary trees in manipulating the data in your programs. Also there is a common application of the trees is "FAMILY TREE". In which we represent a family using the trees. (3) Another example of the directed Graph is "The World Wide Web ". The files are the vertices. A link from one file to another is a directed edge (or arc). These are the few examples.

Question: Are Isomorphic graphs are reflexive, symmetric and transitive?

Answer: We always talk about " RELXIVITY"" SYMMETRIC" and TRANSIVITY of a relation. We never say that a graph is reflexive, symmetric or transitive. But also remember that we draw the graph of a relation which is reflexive and symmetric and the property of reflexivity and symmetric is evident from the graphs, we can't draw the graph of a relation such that transitive property of the relation is evident. Now consider the set of all graphs say it G, this being a set ,so we can define a relation from the set G to itself. So we define the relation of Isomorphism on the set G x G.(By the definition of isomorphism) Our claim is that this relation is an " Equivalence Relation" which means that the relation of Isomorphism's of two graphs is "REFLEXIVE" "SYMMETRIC" and "TRANSITIVE". Now if you want to draw the graph of this relation, then the vertices of this graph are the graphs from the set G.

Question: Why we can't use the same color in connected portions of planar graph?

Answer: We define the coloring of graph in such a manner that we can't assign the same color to the adjacent vertices because if we give the same colors to the adjacent vertices then they are indistinguishable. Also note that we can give the same color to the adjacent vertices but such a coloring is called improper coloring and the way which we define the coloring is known as the proper coloring. We are interested in proper coloring that's why all the books consider the proper coloring

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Question: What is meant by isomorphic invariant?

Answer: A property "P" of a graph is known as Isomorphic invariant. if the same property is found in all the graphs which are isomorphic to it. And all these properties are called isomorphic invariant (Also it clear from the words Isomorphic Invariant that the properties which remain invariant if the two graphs are isomorphic to each other).

Question: What is an infinite Face?

Answer: When you draw a Planar Graph on a plane it divides the plane into different regions, these regions are known as the faces and the face which is not bounded by the edges of the graph is known as the Infinite face. In other words the region which is unbounded is known as Infinite Face.

Question: What is "Bipartite Graph"?

Answer: A graph is said to be Bipartite if it's set of vertices can be divided into two disjoint sets such that no two vertices of the same set are adjacent by some edge of the graph. It means that the edges of one set will be adjacent with the vertices of the other set.

Question: What is chromatic number?

Answer: While coloring a graph you can color a vertex which is not adjacent with the vertices you already colored by choosing a new color for it or by the same color which you have used for the vertices which are not adjacent with this vertex. It means that while coloring a graph you may have different number of colors used for this purpose. But the least number of colors which are being used during the coloring of Graphs is known as the Chromatic number.

Question: What is the role of Discrete mathematics in our prectical life. what advantages will we get by learning it.

Answer: In many areas people have to faces many mathematical problems which can,t be solved in computer so discrete mathematics provide the facility to overcome these problems. Discrete math also covers the wide range of topics, starting with the foundations of Logic, Sets and Functions. It moves onto integer mathematics and matrices, number theory, mathematical reasoning, probability graphs, tree data structures and Boolean algebra.So that is why we need discrete math.

Question: What is the De Morgan's law .

Answer: De Morgan law states " Negation of the conjunction of two statements is logiacally equivalent to the disjunction of their negation and Negation of the disjunction of two statements is logically equivalent to the conjucnction of their negation". i.e. ~(p^q) = ~p v ~q and ~(p v q)= ~p ^ ~q For example: " The bus was late and jim is waiting "(this is an example of conjuction of two statements) Now apply neaggation on this statement you will get through De Morgan's law " The bus was not late or jim is not waiting" (this is the disjunction of negation of two statements). Now see both statement are logically equivalent.Thats what De Morgan want to say

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Question: What is Tauology?

Answer: A tautology is a statement form that is always true regardless of the truth values of the statement variables. i.e. If you want to prove that (p v q) is tautology ,you have to show that all values of statement (p v q) are true regardless of the values of p and q.If all the values of the satement (p v q) is not true then this statement is not tautology.

Question: What is binary relations and reflexive,symmetric and transitive.

Answer: Dear student! First of all ,I will tell you about the basic meaning of relation i.e It is a logical or natural association between two or more things; relevance of one to another; the relation between smoking and heart disease. The connection of people by blood or marriage. A person connected to another by blood or marriage; a relative. Or the way in which one person or thing is connected with another: the relation of parent to child. Now we turn to its mathematically definition, let A and B be any two sets. Then their cartesian product (or the product set) means a new set "A x B " which contains all the ordered pairs of the form (a,b) where a is in set A and b is in set B. Then if we take any subset say 'R' of "A x B" ,then 'R' is called the binary relation. Note All the subsets of the Cartesian product of two sets A and B are called the binary relations or simply a relation,and denoted by R. And note it that one raltion is also be the same as "A x B". Example: Let A={1,2,3} B={a,b} be any two sets. Then their Cartesian product means "A x B"={ (1,a),(1,b),(2,a),(2,b),(3,a),(3,b) } Then take any set which contains in "A x B" and denote it by 'R'. Let we take R={(2,b),(3,a),(3,b)} form "A x B". Clearly R is a subset of "A x B" so 'R' is called the binary relation. A reflexive relation defined on a set say 'A' means "all the ordered pairs in which 1st element is mapped or related to itself." For example take a relation say R1= {(1,1), (1,2), (1,3), (2,2) ,(2,1), (3,1) (3,3)} from "A x B" defined on the set A={1,2,3}. Clearly R1 is reflexive because 1,2 and 3 are related to itself. A relation say R on a set A is symmetric if whenever aRb then bRa,that is ,if whenever (a,b) belongs to R then (b,a) belongs to R for all a,b belongs to A. For example given a relation which is R1={(1,1), (1,2), (1,3), (2,2) ,(2,1), (3,1) (3,3)} as defined on a set A={1,2,3} And a relation say R1 is symmetric if for every (a, b) belongs to R ,(b, a) also belongs to R. Here as (a, b)=(1,1) belongs to R then (b, a)=(1,1)also belongs to R. as (a,b)=(1,2) belongs to R then (b,a)=(2,1)also belongs to R. as (a,b)=(1,3) belongs to R then (b,a)=(3,1)also belongs to R.etc So clearly the above relation R is symmetric. And read the definition of transitive relation from the handouts and the book. You can easily understand it.

Question: What is the matrix relation .

Answer: Suppose that A and B are finite sets.Then we take a relation say R from A to B. From a rectangular array whose rows are labeled by the elements of A and whose columns are labeled by the elements of B. Put a 1 or 0 in each position of the array according as a belongs to A is or is not related to b belongs to B. This array is called the matrix of the relation. There are matrix relations of reflexive and symmetric relations. In reflexive relation, all the diagonal elements of relation should be equal to 1. For example if R = {(1,1), (1,3), (2,2), (3,2), (3,3)} defined on A = {1,2,3}. Then clearly R is reflexive. Simply in making matrix relation In the above example,as the defined set is A={1,2,3} so there are total three elements. Now we take 1, 2 and 3 horizontally and vertically.i.e we make a matrix from the relation R ,in the matrix you have now 3 columns and 3 rows. Now start to make the matrix ,as you have first order pair (1, 1) it means that 1 maps on itself and you write 1 in 1st row and in first column. 2nd order pair is (1, 3) it means that arrow goes from 1 to 3.Then you have to write 1 in 1st row and in 3rd column. (2, 2) means that arrow goes from 2 and ends itself. Here you have to write 1 in 2nd row and in 2nd column. (3,2) means arrow goes from 3 and ends at 2. Here you have to write 1 in 3rd row and in 2nd column. (3, 3) means that 3 maps on itself and you write 1 in 3rd row and in 3rd column. And where there is space empty or unfilled ,you have to write 0 there.

Question: what is binary relation.

Answer: Let A and B be any two sets. Then their cartesian product(or the product set) means a new set "A x B " which contains all the ordered pairs of the form (a,b) where a is in set A and b is in set B. Let we take any subset say 'R' of "A x B" ,then 'R' is called the binary relation. Note it that 'R' also be the same as "A x B". For example: Let A={1,2,3} B={a,b} be any two sets. Then their cartesian product means "A x B"={ (1,a),(1,b),(2,a),(2,b),(3,a),(3,b) } Then take any set which contains in "A x B" and denote it by 'R'. Let R={(2,b),(3,a),(3,b)} Clearly R is a subset of "A x B" so 'R' is called the binary relation.

Question: Role of "Discrete Mathematics" in our prectical life. what advantages will we get by learning it.

Answer: Discrete mathematics concerns processes that consist of a sequence of individual steps. This distinguishes it from calculus, which studies continuously changing processes. While the ideas of calculus were fundamental to the science and technology of the industrial revolution, the ideas of discrete mathematics underline the science and technology specific to the computer age. Logic and proof: An important goal of discrete mathematics is to develop students' ability to think abstractly. This requires that students learn to use logically valid forms of argument, to avoid common logical errors, to understand what it means to reason from definition, and to know how to use both direct and indirect argument to derive new results from those already known to be true. Induction and Recursion: An exciting development of recent years has been increased appreciation for the power and beauty of "recursive thinking": using the assumption that a given problem has been solved for smaller cases, to solve it for a given case. Such thinking often leads to recurrence relations, which can be "solved" by various techniques, and to verifications of solutions by mathematical induction. Combinatorics: Combinatorics is the mathematics of counting and arranging objects. Skill in using combinatorial techniques is needed in almost every discipline where mathematics is applied, from economics to biology, to computer science, to chemistry, to business management. Algorithms and their analysis: The word algorithm was largely unknown three decades ago. Yet now it is one of the first words encountered in the study of computer science. To solve a problem on a computer, it is necessary to find an algorithm or step-by-step sequence of instructions for the computer to follow. Designing an algorithm requires an understanding of the mathematics underlying the problem to be solved. Determining whether or not an algorithm is correct requires a sophisticated use of mathematical induction. Calculating the amount of time or memory space the algorithm will need requires knowledge of combinatorics, recurrence relations functions, and O-notation. Discrete Structures: Discrete mathematical structures are made of finite or count ably infinite collections of objects that satisfy certain properties. Those are sets, bolean of algebras, functions, finite start automata, relations, graphs and trees. The concept of isomorphism is used to describe the state of affairs when two distinct structures are the same intheir essentials and diffr only in the labeling of the underlying objects. Applications and modeling: Mathematics topic are best understood when they are seen ina variety of contexts and used to solve problems in a broad range of applied situations. One of the profound lessons of mathematics is that the same mathematical model can be used to solve problems in situations that appear superficially to be totally dissimilar. So in the end i want to say that discrete mathematics has many uses not only in computer science but also in the other fields too.

Question: what is the basic difference b/w sequences and series

Answer: A sequence is just a list of elements .In sequnce we write the terms of sequence as a list (seperated by comma's). e.g 2,3,4,5,6,7,8,9,... (in this we have terms 2,3,4,5,6,7,8,9 and so on).we write these in form of list seperated by comma's. And the sum of the terms of a sequence forms a series. e.g we have sequence 1,2,3,4,5,6,7 Now the series is sum of terms of sequence as 1+2+3+4+5+6+7.

Question: what is the purpose of permutations?

Answer: Permutation is an arrangement of objects in a order where repitition is not allowed. We need arrangments of objects in real life and also in mathematical problems.We need to know in how many ways we can arrange certain objects. There are four types of arrangments we have in which one is permutation.

Question: what is inclusion-exclusion principle

Answer: Inclusion-Exclusion principle contain two rules which are If A and B are disjoint finite sets, then n(AÈB) = n(A) + n(B) And if A and B are finite sets, then n(AÈB) = n(A) + n(B) - n(AÇB) For example If there are 15 girls students and 25 boys students in a class then how many students are in total. Now see if we take A ={ 15 girl students} and B={ 25 boys students} Here A and B are two disjoints sets then we can apply first rule n(AÈB) = n(A) + n(B) =15 + 25 =40 So in total there are 40 students in class. Take another Example for second rule. How many integers from 1 through 1000 are multiples of 3 or multiples of 5. Let A and B denotes the set of integers from 1 through 1000 that are multiples of 3 and 5 respectivly. n(A)= 333 n(B)=200 But these two sets are not disjoint because in A and B we have those elements which are multiple of both 3 and 5. so n(AÇB) =66 n(AÈB) = n(A) + n(B) - n(AÇB) =333 + 200 - 66 = 467

Question: How to use conditional probobility

Answer: Dear student In Conditional probability we put some condition on an event to be occur. e.g. A pair of dice is tossed. Find the probability that one of the dice is 2 if the sum is 6. If we have to find the probability that one of the dice is 2, then it is the case of simple probability. Here we put a condition that sum is six. Now A = { 2 appears in atleast one die} E = {sum is 6 } Here E = { (1,5), (2, 4), (3, 3), (4, 2), (5, 1) } Here two order pairs (2, 4) and (4, 2) satisfies the A. (i.e. belongs to A) Now A (intersection) B= { (2,4), (4,2)} Now by formula P(A/E) = P(A (intersection) E)/ P(E) = 2/5

Question: In which condition we use combination and in which condition permutation.

Answer: This depends on the statement of question. If in the statement of question you finds out that repetition of objects are not allowed and order matters then we use Permutation. e.g. Find the number of ways that a party of seven persons can arrange themselves in a row of seven chairs. See in this question repetition is no allowed because whenever a person is chosen for a particular seat r then he cannot be chosen again and also order matters in the arrangements of chairs so we use permutation here. If in the question repetition of samples are not allowed and order does not matters then we use combination. A student is to answer eight out of ten questions on an exam. Find the number m of ways that the student can choose the eight questions See in this question repetition is not allowed that is when you choose one question then you cannot choose it again and also order does not matters(i.e either he solved Q1 first or Q2 first) so you use combination in this question.

Question: What is the differnce between edge and vertex

Answer: Vertices are nodes or points and edges are lines/arcs which are used to connect the vertices. e.g If you are making the graph to find the shortest path or for nay purpose of cites and roads between them which contain Lahore, Islamabad, Faisalabad , Karachi, and Multan. Then cities Lahore, Islamabad, Faisalabad , Karachi, and Multan are vertices and roads between them are edges.

Question: What is the differnce between yes and allowed in graphs.

Answer: Allowed mean that specific property can be occurs in that case but yes mean that specific property always occurs in that case. e.g. In Walk you may start and end at same point and may not be (allowed). But in Closed Walk you have to start and end at same point (yes).

Question: what is the meanging of induction? and also Mathematical Induction?

Answer: Basic meaning of induction is: a)The act or an instance of inducting. b) A ceremony or formal act by which a person is inducted, as into office or military service. In Mathematics. A two-part method of proving a theorem involving a positive integral variable. First the theorem is verified for the smallest admissible value of the integer. Then it is proven that if the theorem is true for any value of the integer, it is true for the next greater value. The final proof contains the two parts. As you have studied. It also means that presentation of material, such as facts or evidence, in support of an argument or a proposition. Whether in Physics Induction means the creation of a voltage or current in a material by means of electric or magnetic fields, as in the secondary winding of a transformer when exposed to the changing magnetic field caused by an alternating current in the primary winding. In Biochemistry,it means that the process of initiating or increasing the production of an enzyme or other protein at the level of genetic transcription. In embryology,it means that the change in form or shape caused by the action of one tissue of an embryo on adjacent tissues or parts, as by the diffusion of hormones or chemicals.

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Question: What is "Hypothetical Syllogism".

Answer: Hypothetical syllogism is a law that if the argument is of the form p --> q q---> r Therefore p---> r Then it'll always be a tautology. i.e. if the p implies q and q implies r is true then its conclusion p implies r is always true.

Question: A set is define a well define collection of distinct objects so why an empty set is called a set although it has no element?

Answer: Some time we have collection of zero objects and we call them empty sets. e.g. Set of natural numbers greater than 5 and less than 5. A = { x belongs to N / 5< x < 5 } Now see this is a set which have collection of elements which are greater than 5 and less than 5 (from natural number).

Question: What is improper subset.

Answer: Let A and B be sets. A is proper subset of B, if, and only if, every element of A is in B but there is at least on element if B that is not in A. Now A is improper subset of B, if and only if, every element of A is in B and there is no element in B which is not in A. e.g. A= { 1, 2 , 3, 4} B= { 2, 1, 4, 3} Now A is improper subset of B. Because every element of A is in B and there is no element in B which is not in A

Question: How to check validity and unvalidity of argument through diagram.

Answer: To check an argument is valid or not you can also use Venn diagram. We identify some sets from the premises . Then represent those sets in the form of diagram. If diagram satisfies the conclusion then it is a valid argument otherwise invalid. e.g. If we have three premises S1: all my friends are musicians S2: John is my friend. S3: None of my neighbor are musicians. conclusion John is not my neighbor. Now we have three sets Friends, Musicians, neighbors. Now you see from premises 1 and 2 that friends are subset of musicians .From premises 3 see that neighbor is an individual set that is disjoint from set musicians. Now represent then in form of Venn diagram. Musicians neighbour Friends Now see that john lies in set friends which is disjoint from set neighbors. So their intersection is empty.Which shows that john is not his neighbor. In that way you can check the validity of arguments

Question: why we used venn digram?

Answer: Venn diagram is a pictorial representation of sets. Venn diagram can sometime be used to determine whether or not an argument is valid. Real life problems can easily be illustrate through Venn diagram if you first convert them into set form and then in Venn diagram form. Venn diagram enables students to organize similarities and differences visually or graphically. A Venn diagram is an illustration of the relationships between and among sets, groups of objects that share something in common.

Question: what is composite relation .

Answer: Let A, B, and C be sets, and let R be relation from A to B and let S be a relation from B to C. Now by combining these two relations we can form a relation from A to C. Now let a belongs to A, b belongs to B, and c belongs to C. We can write relations R as a R b and S as b S c. Now by combining R and S we write a (R 0 S) c . This is called composition of Relations holding the condition that we must have a b belongs to B which can be write as a R b and b S c (as stated above) . e.g. Let A= {1,2,3,4}, B={a,b,c,d} , C ={x,y,z} and let R={ {1,a), (2, d), (3, a), (3, b), (3, d) } and S={ (b, x), (b, z), (c, y), (d, z)} Now apply that condition which is stated above (that in the composition R O S only those order pairs comes which have earlier an element is common in them e.g. from R we have (3, b) and from S we have (b, x) .Now one relation relate 3 to b and other relates b to x and our composite relation omits that common and relates directly 3 to x.) I do not understand your second question send it again. Now R O S ={(2,z), (3,x), (3,z)}

Question: What are the conditions to confirm functions .

Answer: The first condition for a relation from set X to a set Y to be a function is 1.For every element x in X, there is an element y in Y such that (x, y) belongs to F. Which means that every element in X should relate with distinct element of Y. e.g if X={ 1,2,3} and Y={x, y} Now if R={(1,x),(2,y),(1,y),(2,x)} Then R will not be a function because 3 belongs to X but is does not relates with any element of Y. so R={(1,x),(2,y),(3,y)} can be called a function because every element of X is relates with elements of Y. Second condition is : For all elements x in X and y and z in Y, if (x,

y) belongs to F and (x, z) belongs to F, then y = z Which means that every element in X only relates with distinct element of Y. i.e. R={(1,x),(2,y),(2,x), (3,y)} cannot be called as function because 2 relates with x and y also.

Question: When a function is onto.

Answer: First you have to know about the concept of function. Function:It is a rule or a machine from a set X to a set Y in which each element of set X maps into the unique element of set Y. Onto Function: Means a function in which every element of set Y is the image of at least one element in set X. Or there should be no element left in set Y which is the image of no element in set X. If such case does not exist then the function is not called onto. For example:Let we define a function f : R----R such that f(x)=x^2 (where ^ shows the symbol of power i.e. x raise to power 2). Clearly every element in the second set is the image of atleast one element in the first set. As for x=1 then f(x)=1^2=1 (1 is the image of 1 under the rule f) for x=2 then f(x)=2^2=4 (4 is the image of 2 under the rule f) for x=0 then f(x)=0^2=0 (0 is the image of 0 under the rule f) for x=-1 then f(x)=(-1)^2=1 (1 is the image of -1 under the rule f) So it is onto function.

Question: Is Pie an irrational number?

Answer: Pi π is an irrational number as its exact value has an infinite decimal expansion: Its decimal expansion never ends and does not repeat.

The numerical value of π truncated to 50 decimal places is:

3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510

Question: Difference between sentence and statement.

Answer: A sentence is a statement if it have a truth value otherwise this sentence is not a statement.By truth value i mean if i write a sentence "Lahore is capital of Punjab" Its truth value is "true".Because yes Lahore is a capital of Punjab. So the above sentence is a statement. Now if i write a sentence "How are you" Then you cannot answer in yes or no.So this sentence is not a statement. Every statement is a sentence but converse is not true.

Question: What is the truth table?

Answer: Truth table is a table which describe the truth values of a proposition. or we can say that Truth table display the complete behaviour of a proposition. There fore the purpose of truth table is to identify its truth values. A statement or a proposition in Discrete math can easily identify its truth value by the truth table. Truth tables are especially valuable in the determination of the truth values of propositions constructed from simpler propositions. The main steps while making a truth table are "first judge about the statement that how much symbols(or variables) it contain. If it has n symbols then total number of combinations=2 raise to power n. These all the combinations give the truth value of the statement from where we can judge that either the truthness of a statement or proposiotion is true or false. In all the combinations you have to put values either "F" or "T" against the variales.But note it that no row can be repeated. For example "Ali is happy and healthy" we denote "ali is happy" by p and "ali is healthy" by q so the above statement contain two variables or symbols. The total no of combinations are =2 raise to power 2(as n=2) =4 which tell us the truthness of a statement.

Question: how empty set become a subset of every set.

Answer: If A & B are two sets, A is called a subset of B, if, and only if, every element of A is also an element of B. Now we prove that empty set is subset of any other set by a contra positive statement(of above statement) i.e. If there is any element in the the set A that is not in the set B then A is not a subset of B. Now if A={} and B={1,3,4,5} Then you cannot find an element which is in A but not in B. So A is subset of B.

Question: What is rational and irrational numbers.

Answer: A number that can be expressed as a fraction p/q where p and q are integers and q\not=0, is called a rational number with numerator p and denominator q. The numbers which cannot be expressed as rational are called irrational number. Irrational numbers have decimal expansions that neither terminate nor become periodic where in rational numbers the decimal expansion either terminate or become periodic after some numbers.

Question: what is the difference between graphs and spanning tree?

Answer: First of all, a graph is a "diagram that exhibits a relationship, often functional, between two sets of numbers as a set of points having coordinates determined by the relationship. Also called plot". Or A pictorial device, such as a pie chart or bar graph, used to illustrate quantitative relationships. Also called chart. And a tree is a connected graph that does not contain any nontrivial circuit. (i.e., it is circuit-free) Basically, a graph is a nonempty set of points called vertices and a set of line segments joining pairs of vertices called edges. Formally, a graph G consists of two finite sets: (i) A set V=V(G) of vertices (or points or nodes) (ii) A set E=E(G) of edges; where each edge corresponds to a pair of vertices. Whereas, a spanning tree for a graph G is a subgraph of G that contains every vertex of G and is a tree. It is not neccesary for a graph to always be a spanning tree. Graph becomes a spanning tree if it satisfies all the properties of a spanning tree.

Question: What is the probability ?

Answer: The definition of probability is : Let S be a finite sample space such that all the outcomes are equally likely to occur. The probability of an event E, which is a subset of S, is P(E) = (the number of outcomes in E)/ (the number of total outcomes in S) P(E) = n (E) / n (S) This definition is due to 'Laplace.' Thus probability is a concept which measures numerically the degree of certainty or uncertainty of the occurrence of an event. Explaination The basic steps of probability that u have to remember are as under 1. First list out all possible out comes. That is called the sample space S For example when we roll a die the all possible outcomes are the set S i.e.

S = {1,2,3,4,5,6} 2. Secondly we have to find out all that possible outcomes, in which the probability is required . For example we are asked to find the probability of even numbers. First we decide any name of that event i.e E Now we check all the even numbers in S which are E = {2,4,6} Remember Event is always a sub-set of Sample space S. 3. Now we apply the definition of probability P(E) = (the number of outcomes in E)/ (the number of total outcomes in S) P(E) = n (E) / n (S) So from above two steps we have n (E) = 3 and n (S) = 6 then P(E) = 3 / 6 = 1/2 which is probability of an even number.

Question: what is permutation?

Answer: Permutation comes from the word permute which means " to change the order of." Basically permutation means a "complete change." Or the act of altering a given set of objects in a group. In Mathematics point of view it means that a ordered arrangement of the elements of a set (here the order of elements matters but repetition of the elements is not allowed).

Question: What is a function.

Answer: A function say 'f' is a rule or machine from a set A to the set B if for every element say a of A, there exist a unique element say b of set such that b=f(a) Where b is the image of a under f,and a is the pre-image. Note it that set A is called the domain of f and Y is called the codomain of f. As we know that function is a rule or machine in which we put an input,and we get an output.Like that a juicer machine.We take some apples(here apples are input) and we apply a rule or a function of juicer machine on it,then we get the output in the form of juice.

Question: What is p implies q.

Answer: p--- >q means to "go from hypothesis to a conclusion" where p is a hypothesis and q is a conclusion. And note it that this statement is conditioned because the "truth ness of statement p is conditioned on the truth ness of statement q". Now the truth value of p--->q is false only when p is true and q is false otherwise it will always true. E.g. consider an implication "if you do your work on Sunday ,I will give you ten rupees." Here p=you do your work on Sunday (is the hypothesis) , q=I will give you ten rupees (the conclusion or promise). Now the truth value of p---->q will false only when the promise is braked. i.e. You do your work on Sunday but you do not get ten rupees. In all other conditions the promise is not braked.

Question: What is valid and invalid arguments.

Answer: As "an argument is a list of statements called premises (or assumptions or hypotheses) which is followed by a statement called the conclusion. " A valid argument is one in which the premises entail(or imply) the conclusion. 1)It cannot have true premises and a false conclusion. 2)If its premises are true, its conclusion must be true. 3)If its conclusion is false, it must have at least one false premise. 4)All of the information in the conclusion is also in the premises. And an invalid agrument is one in which the premises do not entail(or imply) the conclusion. It can have true premises and a false conclusion. Even if its premises are true, it may have a false conclusion. Even if its conclusion is false, it may have true premises. There is information in the conclusion that is not in the premises. To know them better,try to solve more and more examples and exercises.

Question: What is domain and co -domain.

Answer: Domain means "the set of all x-coordinates in a relation". It is very simple,Let we take a function say f from the set X to set Y. Then domain means a set which contain all the elements of the set X. And co domain means a set which contain all the elements of the set Y. For example: Let we define a function "f" from the set X={a,b,c,d} to Y={1,2,3,4}. such that f(a)=1, f(b)=2, f(c)=3, f(d)=1 Here the domain set is {a,b,c,d} And the co-domain set is {1,2,3,4} Where as the image set is {1,2,3}.Because f(a)=1 as 1 is the image of a under the rule 'f'. f(b)=2 as 2 is the image of b under the rule 'f'. f(c)=3 as 3 is the image of c under the rule 'f'. f(d)=1as 1 is the image of d under the rule 'f'. because "image set contains only those elements which are the images of elements found in set X". Note it that here f is one -one but not onto,because there is one element '4' left which is the image of nothing element under the rule 'f'.

Question: What is the difference between k-sample,k-selection, k-permutation and k-combination?

Answer: Actually, these all terms are related to the basic concept of choosing some elements from the given collection.

For it, two things are important:

1) Order of elements .i.e. which one is first, which one is second and so on.

2) Repetition of elements

So we can get 4 kinds of selections:

1) The elements have both order and repetition. (It is called k-sample)

2) The elements have only order, but no repetition. (It is called k-permutation)

3) The elements have only repetition, but no order. (It is called k-selection)

4) The elements have no repetition and no order. (It is called k-combination)

Question: What is a combination?

Answer: A combination is an un-ordered collection of unique elements. Given S, the set of all possible unique elements, a combination is a subset of the elements of S. The order of the elements in a combination is not important (two lists with the same elements in different orders are considered to be the same combination). Also, the elements cannot be repeated in a combination (every element appears uniquely once

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Question: why is 0! equal to 1?

Answer: Since n! = n(n-1)!

Put n =1 in it.

1! = 1x(1 – 1)!

1! =1x0!

1! = 0!

Since 1! = 1

So 1 = 0!

0! = 1.

Question: What is the basic idea if Mathematical Induction?

Question: Define symmetric and anti-symmetric.

Answer:

Question: What is the main deffernce between Calculus and Discrete Maths?

Answer: Discrete mathematics is the study of mathematics which concerns to the study of discrete objects. Discrete math build students approach to think abstractly and how to handle mathematical models problems in computer While Calculus is a mathematical tool used to analyze changes in physical quantities. Or "Calculus is sometimes described as the mathematics of change." Also calculus played an important role in industrial area as well discrete math in computer.

Discrete mathematics concerns processes that consist of a sequence of individual steps. This distinguishes it from calculus, which studies continuously changing processes. the ideas of discrete mathematics underline the science and technology specific to the computer age. An important goal of discrete mathematics is to develop students' ability to think abstractly.

Question: Explain Valid Arguments.

Answer: When some statement is said on the basis of a set of other statements, meaning that this statement is derived from that set of statements, this is called an argument. The formal definition is "an argument is a list of statements called **"premises"** (or assumptions or hypotheses) which is followed by a statement called the "**conclusion."**

A **valid argument** is one in which the premises imply the conclusion.

1) It cannot have true premises and a false conclusion.

2) If its premises are true, its conclusion must be true.

3) If its conclusion is false, it must have at least one false premise.

4) All of the information in the conclusion is also in the premises.

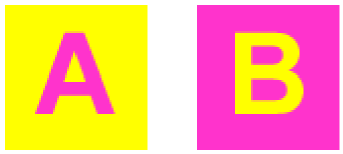
Question: What is the Difference between combinations and permutations?

Answer: When we talk of permutations and combinations in everyday talk we often use the two terms interchangeably. In mathematics, however, the two each have very specific meanings, and this distinction often causes problems

In brief, the permutation of a number of objects is the number of different ways they can be ordered; i.e. which one is first, which one is second or third etc. For example, you see, if we have two digits 1 and 2, then 12 and 21 are different in meaning. So their order has its own importance in permutation.

On the other hand, in combination, the order is not necessary. you can put any object at first place or second etc. For example, Suppose you have to put some pictures on the wall, and suppose you only have two pictures: A and B.

You could hang them



or

We could summarise permutations and combinations (very simplistically) as

Permutations - position important (although choice may also be important)
Combinations - chosen important,
which may help you to remember

Question: What is the use of kruskal's algorithn in our daily life?

Answer: The Kruskal's algorithm is usually used to find minimum spanning tree i.e. the possible smallest tree that contains all the vertices. The standard application is to a problem like phone network design. Suppose, you have a business with several offices; you want to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect different pairs of cities. You want a set of lines that connects all your offices with a minimum total cost. It should be a spanning tree, since if a network isn't a tree you can always remove some edges and save money. A less obvious application is that the minimum spanning tree can be used to approximately solve the traveling salesman problem. A convenient formal way of defining this problem is to find the shortest path that visits each point at least once.

Question: What is irrational number?

Answer: Irrational number An irrational number can not be expressed as a fraction. In decimal form, irrational numbers do not repeat in a pattern or terminate. They "go on forever" (infinity). Examples of irrational numbers are: pi= 3.141592654...

Question: Define membership table and truth table.

Answer: Membership table: A table displaying the membership of elements in sets. Set identities can also be proved using membership tables. An element is in a set, a 1 is used and an element is not in a set, a 0 is used. Truth table: A table displaying the truth values of propositions.

Question: Define function and example for finding domain and range of a function.

Answer:

Question: Why do we use konigsberg bridges problem?

Answer: Click on it.

Question: Explain the intersection of two sets?

Answer: Click on it.

Question: What is absurdity With example?

Answer:

Question: What is sequence and series?

Answer: Sequence A sequence of numbers is a function defined on the set of positive integer. The numbers in the sequence are called terms. Another way, the sequence is a set of quantities u1, u2, u3... stated in a definite order and each term formed according to a fixed pattern. U r =f(r) In example: 1,3,5,7,... 2,4,6,8,... 1 2 ,− 2 2 ,3 2 ,− 4 2 ,... Infinite sequence:- This kind of sequence is unending sequence like all natural numbers: 1, 2, 3, ... Finite sequence:- This kind of sequence contains only a finite number of terms. One of good examples are the page numbers. Series:- The sum of a finite or infinite sequence of expressions. 1+3+5+7+...

Question: Differntiate contigency and contradiction.

Answer:

Question: What is conditional statement, converse, inverse and contra-positive?

Answer:

Question: What is Euclidean algorithm?

Answer: In number theory, the **Euclidean algorithm** (also called **Euclid's algorithm**) is an algorithm to determine the greatest common divisor (GCD) of two integers.

Its major significance is that it does not require factoring the two integers, and it is also significant in that it is one of the oldest algorithms known, dating back to the ancient Greeks.

Question: what is the circle definition?

Answer: A circle is the locus of all points in a plane which are equidistant from a fixed point. The fixed point is called centre of that circle and the distance is called radius of that circle

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Question: What is bi-conditional statement?

Answer:

Question: Explain the difference between k-sample, k-selection, k-combination and k-permutation.

Answer:

Question: What is meant by Discrete?

Answer:

A type of data is discrete if there are only a finite number of values possible. Discrete data usually occurs in a case where there are only a certain number of values, or when we are counting something (using whole numbers). For example, 5 students, 10 trees etc.

Question: Explain D'Morgan Law.

Answer:

Question: What are digital circuits?

Answer: Digital circuits are electric circuits based on a number of discrete voltage levels.

In most cases there are two voltage levels: one near to zero volts and one at a higher level depending on the supply voltage in use. These two levels are often represented as L and H.

Question: What is absurdity or contradiction?

Answer: A statement which is always false is called an absurdity.

Question: What is contingency?

Answer: A statement which can be true or false depending upon the truth values of the variables is called a contingency.

Question: Is there any particular rule to solve Inductive Step in the mathematical Induction?

Answer: In the Inductive Step, we suppose that the result is also true for other integral values k. If the result is true for n = k, then it must be true for other integer value k +1 otherwise the statement cannot be true.

In proving the result for n = k +1, the procedure changes, as it depends on the shape of the given statement.

Following steps are main:

1) You should simply replace n by k+1 in the left side of the statement.

2) Use the supposition of n = k in it.

3) Then you have to simplify it to get right side of the statement. This is the step,

where students usually feel difficulty.

Here sometimes, you have to open the brackets, or add or subtract some terms

or take some term common etc. This step of simplification to get right side of the given statement for n = n + 1 changes from question to question.

Now check this step in the examples of the Lessons 23 and 24.

Question: What is Inclusion Exclusion Principle?

Answer: Click on Inclusion Exclusion Principle.

Question: What is recusion?

Answer:

Question: Different notations of conditional implication.

Answer: If p than q. P implies q. If p , q. P only if q. P is sufficient for q.

Question: What is cartesion product?

Answer: Cartesian product of sets:- Let A and B be sets. The Cartesian product of A and B, denoted A x B (read "A cross B") is the set of all ordered pairs (a, b), where a is in A and b is in B. For example: A = {1, 2, 3, 4, 5, 6} B = {a} A x B = {(1,a), (2,a), (3,a), (4,a), (5,a)}

Question: Define fraction and decimal expansion.

Answer: Fraction:- A number expressed in the form a/b where a is called the numerator and b is called the denominator. Decimal expansion:- The decimal expansion of a number is its representation in base 10 The number 3.22 3 is its integer part and 22 is its decimal part The number on the left of decimal point is integer part of the number and the number on the right of the decimal point is decimal part of the number.

Question: Explane venn diagram.

Answer: Venn diagram is a pictorial representation of sets. Venn diagram can sometime be used to determine whether or not an argument is valid. Real life problems can easily be illustrate through Venn diagram if you first convert them into set form and then in Venn diagram form. Venn diagram enables students to organize similarities and differences visually or graphically. A Venn diagram is an illustration of the relationships between and among sets, groups of objects that share something in common

Question: Write the types of functions.

Answer: Types of function:- Following are the types of function 1. One to one function 2. Onto function 3. Into function 4. Bijective function (one to one and onto function) One to one function:- A function f : A to B is said to be one to one if there is no repetition in the second element of any two ordered pairs. Onto function:- A function f : A to B is said to be onto if Range of f is equal to set B (co-domain). Into function:- A function f : A to B is said to be into function of Range of f is the subset of set B (co domain) Bijective function: Bijective function:- A function is said to be Bijective if it is both one to one and onto.

Question: Explain the pigeonhole principle.

Answer:

Question: What is conditional probability with example?.

Answer:

Question: Explain combinatorics.

Answer: Branch of mathematics concerned with the selection, arrangement, and combination of objects chosen from a finite set.

The number of possible bridge hands is a simple example; more complex problems include scheduling classes in classrooms at a large university and designing a routing system for telephone signals. No standard algebraic procedures apply to all combinatorial problems; a separate logical analysis may be required for each problem.

Question: How the tree diagram use in our real computer life?

Answer: Tree diagrams are used in data structure, compiler construction, in making algorithms, operating system etc.

Question: Write detail of cards.

Answer: Diamond Club Heart Spade A A A A 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4 5 5 5 5 6 6 6 6 7 7 7 7 8 8 8 8 9 9 9 9 10 10 10 10 J J J J Q Q Q Q K K K K Where 26 cards are black & 26 are red. Also ‘A’ stands for ‘ace’ ‘J’ stands for ‘jack’ ‘Q’ stands for ‘queen’ ‘K’ stands for ‘king’

Question: what is the purpose of permutations?

Answer: Definition:- Possible arrangements of a set of objects in which the order of the arrangement makes a difference. For example, determining all the different ways five books can be arranged in order on a shelf. In mathematics, especially in abstract algebra and related areas, a permutation is a bijection, from a finite set X onto itself. Purpose of permutation is to establish significance without assumptions