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|  | How many positive integers n can be formed using the digits 3,4,4,5,5,6,7, if n has to exceed 50, 00000? |
|  | How many permutations of the letters ABCDEFG contain (a) the string BCD, (b) the string CFGA, (c) the strings BA and GF, (d) the strings ABC and DE? |
|  | If 6 people A,B,C,D,E,F are seated about a round table, how many different circular arrangements are possible, If arrangements are considered the same when one can be obtained from another by rotation? |
|  | If a man hiked for 10 hours and covered a total distance of 45 km. It is known that he hiked 6 km in the first four and only 3 km in the last hour. Show that he must have hiked at least 9 km within a certain period of 2 consecutive hours. |
|  | Find the number of integers between 1 and 250 both inclusive that are not divisible by any of the integers 2,3,5 and 7? |
|  | Solve the recurrence relation |
|  | Find a formula for the general term  of the Fibonacci sequence 0,1,1,2,3,5,8,13,… |
|  | Define the following terms:(1) Algebraic structure (2) Semigroup (3)Monoid (4) Group (5) Abelian group |
|  | Is the group "{1, 2, 3, 4, 5, 6} under modulo 7 multiplication" cyclic? If yes, which are generators? Why? |
|  | Let . Does *M* form a group under matrix multiplication? Why? |
|  | Let is homomorphism and f(2)=5, then find the homomorphic image of -8. |
|  | When are two groups homomorphic to each other? Show that is homomorphism if defined as  for  . |
|  | Let , then (G +) is a group. Is  subgroup of G? If yes, Find Distinct number of cosets of H in G. |
|  | Define permutation. Evaluate: (i) (1, 2, 3)(5, 6, 4, 1, 8) (ii)(1, 2)(5, 7, 9) |
|  | State Lagrange’s theorem for order of a finite group G. is converse true? Justify your answer. |
|  | Prove that a cyclic group with only one generator can have at most 2 elements. |
|  | Prove that a non-empty subset H of a group (G,\*) is a subgroup *iff* a\*b-1H for all a, b H. |
|  | What is coset? Define Normal subgroup. Let H be a subgroup of group (G,\*) and a\*bG then (i) a\*H=H iff aH, (ii) a\*H=b\*H *iff* a-1 \*bH. |
|  | Prove that Kurtowski’s second graph is nonplanar. |
|  | Verify Euler’s formula f = e − n + 2 for the graph. Redraw the graph in Fig. such that region 2 becomes the infinite region. |
|  | A simple planar graph to which no edge can be added without destroying its planarity (while keeping the graph simple, of course) is called a maximal planar graph. Prove that every region in a maximal planar graph is a triangle. |
|  | Prove that the chromatic number of a graph will not exceed by more than one the maximum degree of the vertices in a graph. |
|  | Find maximal independent set for the graph. Also,show that the graph has only one chromatic partition. What is it? |
|  | Obtain the chromatic polynomial of the graph shown in Fig. |
|  | A graph of n vertices is a complete graph if and only if its chromatic polynomial is Pn (λ) = λ(λ − 1)(λ − 2) . . . (λ − n + 1). |
|  | Sketch two different (i.e., non-isomorphic) graphs that have the same chromatic polynomial. |
|  | Suppose that you are required to make a class schedule in a university. There are a total of n courses to be taught in m available hours of the week. There are pairs of courses that cannot be taught at the same time because some students might like to take both. Explain how you will make the schedule. State the condition when it will be impossible to make a compatible schedule. |
|  | In a village there are an equal number of boys and girls of marriageable age. Each boy dates a certain number of girls and each girl dates a certain number of boys. Under what condition is it possible that every boy and girl gets married to one of their dates? (Polygamy and polyandry not allowed.) |
|  | In networks define capacity, source, sink, feasible flow, maximal flow, cuts and its capacity. |
|  | State MAX-FLOW MIN-CUT Theorem. Is the flow given below feasible? Find maximum flow with the minimum cut in the capacited flow network. |