

## Course outline

How does an NPTEL online course work?

Propositional Logic

Predicate Logic, Proof Strategies and Induction

Sets and Relations

Equivalence Relations, Partitions, Partial Orderings and Functions

Theory of Countability

Combinatorics Part I

Combinatorics Part II

Solving Linear Non-Homogeneous Recurrence Equations

Catalan Numbers

Catalan Numbers – Derivation of Closed Form Formula

Counting Using Principle of Inclusion-Exclusion

Tutorial 7

Quiz : Week 7 Assignment

New Lesson

Tutorial Problem

Graph Theory Part I

Graph Theory Part II

Number theory

Abstract Algebra : Part I

Abstract Algebra : Part II

Video download

Live Session

Text transcripts

# Week 7 Assignment

The due date for submitting this assignment has passed.

**Due on 2021-03-10, 23:59 IST.**

As per our records you have not submitted this assignment.

1) The number of ways 5 boys and 5 girls can sit circularly so that a boy always sits between two girls is

**2 points**

- 14400  
 1440  
 2880  
 576

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 2880

 2) The number of positive integers  $n$  where  $1 \leq n \leq 1000$ , that are divisible by 2, 3 or 5 is :

**0 points**

- 534  
 500  
 484  
 266

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 266

 3) It is given that set  $A$  has  $m$  elements ( $m \geq 2$ ) and set  $B$  has 2 elements. Consider the following two statements and select the correct option from below. **1 point**

1. The number of one-one functions from  $A$  to  $B$  is  $C(m,2)/2$   
 2. The number of onto functions from  $A$  to  $B$  is  $(2^m - 2)$

- Only 1 is correct  $\forall m$   
 Only 2 is correct  $\forall m$   
 Both 1 and 2 are always correct  $\forall m$   
 Neither of 1 or 2 are always correct  $\forall m$

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 Only 2 is correct  $\forall m$ 

4) The total number of derangements of 1,2,3,4,5 is :

**1 point**

- 11  
 22  
 33  
 44

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 44

 5) In how many ways can ten points on a circle be joined to form five lines (each line joining a pair of points) in such a way that none of the lines cross each other? **1 point**

- 42  
 63  
 84  
 None of the given options

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 42

 6) VIBGYOR game: The game contains 7 boxes and 7 balls. Both the boxes and balls having colors: Violet, Indigo, Blue, Green, Yellow, Orange and Red. The colors of the boxes will be hidden i.e., will not be visible to the person playing the game. A person must drop the colored balls into the seven boxes, exactly one per box. Then, the color of the box will be revealed, and each match between the color of ball dropped with the box will get a point to the person. In how many ways can the person get non-zero points? **1 point**

- 2084  
 3186  
 4288  
 None of the given options

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 3186

7) Which of the following is a solution to the recurrence equation

**1 point**

$$a_n = 4a_{n-1} - 4a_{n-2} + (n+1)2^n$$

when  $a_1 = \frac{19}{3}$  and  $a_2 = \frac{100}{3}$ .

- $a_n = 27x - \frac{62}{3}$   
  $a_n = \left(27x - \frac{62}{3}\right)(2^n - 2n + 1)$   
  $a_n = \left(\frac{n^3}{6} + n^2 + n + 1\right)2^n$   
 None of the given options

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $a_n = \left(\frac{n^3}{6} + n^2 + n + 1\right)2^n$ 

 8) If a man climbs either one or two steps at a time, the total number of ways in which he can climb up a staircase of  $2n$  steps (starting from the bottom) is **1 point**

- $\sum_{r=0}^n C(2n-r, r)$   
  $\sum_{r=0}^{2n} C(2n-r, r)$   
  $\sum_{r=0}^n C(n-r, r)$   
 None of the given options

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $\sum_{r=0}^n C(2n-r, r)$ 

 9) Alice starts at  $(0,0)$  and walks to  $(n,n)$  on the Cartesian plane without crossing the line  $y = x$  (though she might just touch it). At each step, Alice either walks one step to the right or one step upwards i.e., she either moves from  $(x,y)$  to  $(x+1,y)$  or  $(x,y+1)$ . Choose the option(s) which correspond to the number of valid paths Alice can take **1 point**

- $C(2n, n)$   
  $\frac{C(2n, n)}{n+1}$   
  $C(2n+1, n)$   
  $C(2n, n+1)$

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $\frac{C(2n, n)}{n+1}$