

# Unit 12 - Week 10

## Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

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Week 9

Week 10

Introduction to Advanced Counting

Example 1 : Dogs and Cats

Inclusion-Exclusion Formula

Proof of Inclusion - Exclusion formula

Example 2 : Integer solutions of an equation

Example 3 : Words not containing some strings

Example 4 : Arranging 3 x's, 3 y's and 3 z's

Example 5 : Non-multiples of 2 or 3

Example 6 : Integers not divisible by 5, 7 or 11

A tip in solving problems

Example 7 : A dog nor a cat

Example 8 : Brownies, Muffins and Cookies

Example 10 : Integer solutions of an equation

Example 11 : Seating Arrangement - Part 1

Example 11 : Seating Arrangement - Part 2

Example 12 : Integer solutions of an equation

Number of Onto Functions

Formula for Number of Onto Functions

Example 13 : Onto Functions

Example 14 : No one in their own house

Derangements

Derangements of 4 numbers

Example 15 : Bottles and caps

Example 16 : Self grading

Example 17 : Even integers and their places

Example 18 : Finding total number of items

Example 19 : Devising a secret code

Placing rooks on the chessboard

Rook Polynomial

Rook Polynomial

Quiz : Assignment 10

Week 10 Feedback

Week 11

Week 12

Text Transcripts

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## Assignment 10

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

**Due on 2020-04-08, 23:59 IST.**

1) In an farewell party, 7 friends wanted to give gifts to each other. Each person brings one gift and receives one in return. No one receives the gift that he/she brought. In how many ways they can distribute these 8 gifts? **0 points**

- 265  
 256  
 14,833  
 1854

No, the answer is incorrect. Score: 0

Accepted Answers: 1854

2) Let  $|A| = 40$ ,  $|B| = 40$ ,  $|C| = 40$ ,  $|A \cap B| = 10$ ,  $|A \cap C| = 10$ ,  $|B \cap C| = 10$ ,  $|A \cap B \cap C| = 10$ . Then  $|A \cup B \cup C|$  is **1 point**

- 100  
 140  
 150  
 90

No, the answer is incorrect. Score: 0

Accepted Answers: 100

3) The number of non-negative integer solutions for  $a + b + c + d = 18$ , such that  $a, b, c, d \leq 7$  is **1 point**

- 286  
 1044  
 1330  
 246

No, the answer is incorrect. Score: 0

Accepted Answers: 246

4) How many integers from 1 to 100 are multiples of 2 or 3? **1 point**

- 50  
 33  
 16  
 67

No, the answer is incorrect. Score: 0

Accepted Answers: 67

5) Let  $m$  and  $n$  be positive integers with  $m \geq n$ . The number of onto functions from a set with  $m$  elements to a set with  $n$  elements is **1 point**

- $n^m + \binom{n}{1}(n-1)^m + \binom{n}{2}(n-2)^m + \dots + \binom{n}{n-1}1^m$   
  
 $n^m - \binom{n}{1}(n-1)^m + \binom{n}{2}(n-2)^m - \dots + (-1)^{n-1} \binom{n}{n-1}1^m$   
  
 $m^n - \binom{m}{1}(m-1)^n + \binom{m}{2}(m-2)^n - \dots + (-1)^{m-1} \binom{m}{m-1}1^n$   
 None of the above

No, the answer is incorrect. Score: 0

Accepted Answers:  $n^m - \binom{n}{1}(n-1)^m + \binom{n}{2}(n-2)^m - \dots + (-1)^{n-1} \binom{n}{n-1}1^m$

6) In how many ways can 10 distinct chocolates be distributed among 4 students with exactly two students getting nothing? **1 point**

- 6132  
 6122  
 6131  
 None of the above

No, the answer is incorrect. Score: 0

Accepted Answers: 6132

7) How many integers  $n$  with  $1 \leq n \leq 150$  are relatively prime to 70? **1 point**

- 21  
 11  
 61  
 51

No, the answer is incorrect. Score: 0

Accepted Answers: 51

8) Which of the following is the expansion of  $e^{-1}$ ? **1 point**

- $1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \dots + (-1)^n \frac{1}{n!} + \dots$   
  
 $1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots + \frac{1}{n!} + \dots$   
  
 $1 - \frac{1^1}{1!} + \frac{2^2}{2!} - \frac{3^3}{3!} + \dots + (-1)^n \frac{n^n}{n!} + \dots$   
 None of the above

No, the answer is incorrect. Score: 0

Accepted Answers:  $1 - \frac{1}{1!} + \frac{1}{2!} - \frac{1}{3!} + \dots + (-1)^n \frac{1}{n!} + \dots$

9) The number of non-negative integer solutions for  $a + b + c = 11$ , such that  $a \leq 3$ ,  $b \leq 4$  and  $c \leq 6$  is **1 point**

- 21  
 78  
 5  
 6

No, the answer is incorrect. Score: 0

Accepted Answers: 6

10) Let  $|A| = 35$ ,  $|A \cap B| = 10$ ,  $|A \cup B| = 50$ . Then  $|B|$  is **1 point**

- 25  
 35  
 15  
 None of the above

No, the answer is incorrect. Score: 0

Accepted Answers: 25