

# Unit 8 - Week 6

## Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

- Three stories
- Three stories - Connecting the dots
- Mathematical induction - An illustration
- Mathematical Induction - Its essence
- Mathematical Induction - The formal way
- MI - Sum of odd numbers
- MI - Sum of powers of 2
- MI - Inequality 1
- MI - Inequality 1 (solution)
- MI - To prove divisibility
- MI - To prove divisibility (solution)
- MI - Problem on satisfying inequalities
- MI - Problem on satisfying inequalities (solutions)
- MI - Inequality 2
- MI - Inequality 2 solution
- Mathematical Induction - Example 9
- Mathematical Induction - Example 10 solution
- Binomial Coefficients - Proof by induction
- Checker board and Triominoes - A puzzle
- Checker board and triominoes - Solution
- Mathematical induction - An important note
- Mathematical Induction - A false proof
- A false proof - Solution
- Motivation for Pigeonhole Principle
- Group of n people
- Set of n integers
- 10 points on an equilateral triangle
- Pigeonhole Principle - A result
- Consecutive integers
- Consecutive integers solution
- Matching initials
- Matching initials - Solution
- Numbers adding to 9
- Numbers adding to 9 - Solution
- Deck of cards
- Deck of cards - Solution
- Number of errors
- Number of errors - Solution
- Puzzle - Challenge for you

Quiz : Assignment 6

Week 6 Feedback

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Text Transcripts

Download Videos

## Assignment 6

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

**Due on 2020-03-11, 23:59 IST.**

1) How many times must we roll a die in order to be sure to get the same score? 1 point

- 2  
 3  
 6  
 7

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
7

2) Let  $P(n) : n^2 < 2^n$ . Then basis step is: 1 point

- n = 4  
 n = 6  
 n = 5  
 n = 3

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
n = 5

3) Let  $S = \{3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$ . How many integers must be chosen from S, such that there exists two integers whose sum is 17? 1 point

- 8  
 6  
 7  
 5

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
7

4) Let  $A = \{1, 2, 3, \dots, k\}$ . What should be the minimum value of k such that always there are at least 2 numbers having same remainder when divided by 5? 1 point

- 3  
 5  
 6  
 7

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
6

5) For each integer  $n \geq 0$ ,  $11^n - 4^n$  is divisible by 1 point

- 4  
 6  
 7  
 3

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
7

6) A box contains 8 socks of white color and 8 socks of black color, all un-matched. A man takes socks out at random in dark. How many minimum socks must he take out to be sure that he has at least 2 socks of the same color? 1 point

- 9  
 5  
 15  
 3

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
3

7) Let  $P(n)$  be a statement, where  $n \in \mathbb{N}$ , natural numbers.  $P(1)$  is true and  $P(k) \Rightarrow P(k + 1)$ , for some natural number  $k$ . Then  $P(n)$  is true for all  $n$ . 1 point

- True  
 False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

8) Let  $f : X \rightarrow Y$  be a function such that  $|X| > |Y|$ , then by Pigeonhole Principle, we can conclude that 1 point

- f is one-one  
 f is onto  
 f is not one-one  
 f is not onto

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
f is not one-one

9) What is the least value of k such that there must be a pair of numbers from  $\{1, 2, 3, \dots, k\}$ , with a sum equal to 9? 1 point

- 5  
 4  
 6  
 7

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
5

10) Let  $P(n) : n^3 - n$  is divisible by 4, for all  $n \in \mathbb{N}$ .  $P(n)$  is false, because 1 point

- Basis step is false  
 Induction hypothesis and inductive step is wrong  
 Both (a) and (b)  
 None of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Induction hypothesis and inductive step is wrong