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
- Equivalence Relation
- Equivalence Relations and Partitions
- Partial Ordering
- Functions
- Tutorial 4: Part I
- Tutorial 4: Part II
- Quiz : Week 4 Assignment
- Tutorial Problem
Theory of Countability
Combinatorics Part I
Combinatorics Part II
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 4 Asignment

The due date for submitting this assignment has passed.

Due on 2021-02-17, 23:59 IST.

As per our records you have not submitted this assignment.

Equivalence relation, partitions, equivalence classes, poset, Hasse diagram, topological sort, functions

1) Select the incorrect option(s) *2 points*

- The relation R on $\mathbb{Z}$, aRb if $a^2 - b^2 \leq 3$, is an equivalence relation
- The relation R on $\mathbb{Z}$, aRb if $a \neq b$, is an equivalence relation
- The relation R on $\mathbb{Z}$, aRb if $(a+b) \equiv 0 mod 10$, is an equivalence relation

No, the answer is incorrect.
Score: 0
Accepted Answers:
The relation R on $\mathbb{Z}$, aRb if $a^2 - b^2 \leq 3$, is an equivalence relation
The relation R on $\mathbb{Z}$, aRb if $a \neq b$, is an equivalence relation
The relation R on $\mathbb{Z}$, aRb if $(a+b) \equiv 0 mod 10$, is an equivalence relation

2) Which of the following is/are true? *1 point*

- The inverse of a function f exists if f is injective only
- The inverse of a function f exists if f is surjective only
- The inverse of a function f is defined if f is both injective and surjective
- A function that is neither injective or surjective is sometimes invertible

No, the answer is incorrect.
Score: 0
Accepted Answers:
The inverse of a function f is defined if f is both injective and surjective

3) Select the incorrect option(s) from the following: *1 point*

- A relation R on a set A is called partial ordering if it is reflexive, anti-symmetric and transitive.
- A Hasse diagram will contain at most one maximal element and at most one minimal element
- In a given relation R which is reflexive, symmetric and antisymmetric, if some elements cannot be compared with other elements, then R will constitute a poset
- Define $f : \mathbb{Z} \to \mathbb{Z}, f(x) = x^2 + x$; then f is a one-to-one function.

No, the answer is incorrect.
Score: 0
Accepted Answers:
A Hasse diagram will contain at most one maximal element and at most one minimal element
Define $f : \mathbb{Z} \to \mathbb{Z}, f(x) = x^2 + x$; then f is a one-to-one function.

4) The number of distinct equivalence classes based on the relation R=(a,b):a≡bmodp where p is a prime integer : *1 point*

- 1
- (p-1)/2
- p -1
- p

No, the answer is incorrect.
Score: 0
Accepted Answers:
p

5) Consider the poset on the relation R={(a,b):a divides b} over the set of positive integers excluding one (Z^+-1). The minimal element(s) of the given poset is (are): *1 point*

- 2 is the minimal element
- The set of elements, {2}∪3,5,7,9,...
- The set of odd numbers 3,5,7,9,...
- None of the given options

No, the answer is incorrect.
Score: 0
Accepted Answers:
None of the given options

6) Consider the functions $f_1 : A \to B$ and $f_2 : A \to B$ such that: *1 point*

$$f_1(x) = 2x + 4,$$
$$f_2(x) = 4x + 2,$$

where A is set of integers and B is set of even integers. Which of the following are true about the function f?

- Both f_1 and f_2 are one-one
- Both f_1 and f_2 are onto
- Both f_1 and f_2 are bijections
- Only f_1 is a bijection
- f_2 is not a bijection

No, the answer is incorrect.
Score: 0
Accepted Answers:
Both f_1 and f_2 are one-one
Only f_1 is a bijection
f_2 is not a bijection

7) Let $\mathcal{F}$ be the set of all functions $f: \mathbb{N}_0 \to \mathbb{R}^+$ where $\mathbb{N}_0$ is the set of all whole numbers i.e., $\mathbb{N}_0 = \mathbb{N} \cup \{0\}$. Let Θ be a relation on $\mathcal{F}$ such that $(f, g) \in \Theta$ for any two functions $f, g \in \mathcal{F}$ if and only if there exists positive constants c_1, c_2 and n_0 such that $0 \leq c_1 g(n) \leq f(n) \leq c_2 g(n)$ for all $n \geq n_0$. Choose the correct statement(s). *1 point*

- Θ is reflexive
- Θ is transitive
- Θ is symmetric
- Θ is an equivalence relation

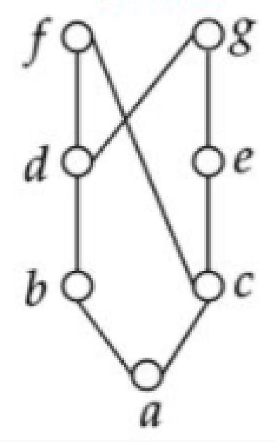
No, the answer is incorrect.
Score: 0
Accepted Answers:
Θ is reflexive
Θ is transitive
Θ is symmetric
Θ is an equivalence relation

8) Let $\mathcal{F}$ be the set of all functions $f: \mathbb{N}_0 \to \mathbb{R}^+$ where $\mathbb{N}_0$ is the set of all whole numbers i.e., $\mathbb{N}_0 = \mathbb{N} \cup \{0\}$. Let O be a relation on $\mathcal{F}$ such that $(f, g) \in O$ for any two functions $f, g \in \mathcal{F}$ if and only if there exists positive constants c and n_0 such that $0 < f(n) \leq c g(n)$ for all $n \geq n_0$. Choose the correct statement(s). *1 point*

- O is a partial order
- O is a total order
- O is an equivalence relation
- None of the given options

No, the answer is incorrect.
Score: 0
Accepted Answers:
None of the given options

9) Choose the correct statement(s) based on the Hasse diagram given below *1 point*



- g is the greatest element
- a is the least element
- (a,b,d,c,f,e,g) is a valid topological ordering
- (a,b,c,d,e,f,g) is a valid topological ordering

No, the answer is incorrect.
Score: 0
Accepted Answers:
a is the least element
(a,b,d,c,f,e,g) is a valid topological ordering
(a,b,c,d,e,f,g) is a valid topological ordering