Week 2 Assignment

The due date for submitting this assignment has passed.

Due on 2021-02-07, 23:59 IST.

As per our records you have not submitted this assignment.

Predicate logic, quantifiers (bounded and free variables), logical equivalence in predicate logic, nested quantifiers, rules of inference for quantifiers, proof strategies: direct and indirect (Proof by contrapositive, vacuous proof, proof by contradiction), proofs involving quantified statements, induction

1) Which of the following represents the statement "All real numbers are complex numbers"? ***2 points***

- ∃x: [real (x)→ complex(x)]
- ∀x: [real (x) ∧ complex(x)
- ∃x: [real (x) ∨ complex(x)]
- ∀x: [real (x)→ complex(x)]

No, the answer is incorrect.
Score: 0

Accepted Answers:
∀x: [real (x)→ complex(x)]

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

- Backward reasoning technique is an example of direct proof methodology
- To prove p → q, we can show ¬p →¬ q, which is proof by contradiction
- To prove p → q by contradiction, we need to prove p ˄ ¬ q → FALSE is a tautology
- None of the given statements

No, the answer is incorrect.
Score: 0

Accepted Answers:
To prove p → q by contradiction, we need to prove p ˄ ¬ q → FALSE is a tautology

3) Which of the following is/are false? ***1 point***

- A statement that is existentially quantified to be true does not always imply it is universally quantified to be true
- One counter example is enough to disprove a universally quantified true statement
- One example is necessary to prove an existentially quantified statement
- A universally quantified statement need not necessarily imply the existential quantification of the same statement

No, the answer is incorrect.
Score: 0

Accepted Answers:
A universally quantified statement need not necessarily imply the existential quantification of the same statement

4) Choose the domain(s) for ∀x:P(x) is true where the predicate P(x): x has a multiplicative inverse. ***1 point***

- N, the set of natural numbers
- C, the set of complex numbers
- R, the set of real numbers
- None of the options

No, the answer is incorrect.
Score: 0

Accepted Answers:
None of the options

5) How many free and bounded variable(s) the following expression has? (∀x:P(x)∧ Q(x))∨(∀y:[R(y)∨S(y)]∨B(w))∧A(z) ***1 point***

- (2, 2)
- (3, 2)
- (2, 3)
- None of the given options

No, the answer is incorrect.
Score: 0

Accepted Answers:
(3, 2)

6) Select the incorrect statement(s) from the following. ***1 point***

- ∀x: P(x)∧Q(x) is true given P(x):x is an even number and Q(x):x is divisible by 2 where domain = {0,2,4,6,8,10}
- If a statement is proved using Proof by induction, then it implies that the same statement can also be proved using Proof by strong induction
- Proving existentially quantified statement automatically proves the uniqueness
- Given the premises: "All books are rocks" and "No rock is hard". Then, the conclusion "There is a book which is hard" is valid.

No, the answer is incorrect.
Score: 0

Accepted Answers:
∀x: P(x)∧Q(x) is true given P(x):x is an even number and Q(x):x is divisible by 2 where domain = {0,2,4,6,8,10}
Proving existentially quantified statement automatically proves the uniqueness
Given the premises: "All books are rocks" and "No rock is hard". Then, the conclusion "There is a book which is hard" is valid.

7) Let M(x): x is a child, V(x): x goes to school. Convert the following into its equivalent predicate logic statement where the domain is over set of all people. "Every child must go to school" ***1 point***

- ∀x: [M(x)∧V(x)]
- ∀x:[M(x)→V(x)]
- ∃x:[M(x)∧¬V(x)]
- ∀x:[¬M(x) ∨ V(x)]

No, the answer is incorrect.
Score: 0

Accepted Answers:
∀x:[M(x)→V(x)]
∀x:[¬M(x) ∨ V(x)]

8) Which of the following statements is logically equivalent to ∀x:[(P(x)∧Q(x))→R(x)]∧∀x:[(P(x)∧R(x))→Q(x)]. ***0 points***

- ∃x:[P(x)→(Q(x)↔R(x))]
- ∀x:[P(x)→(Q(x)↔R(x))]
- ∃x:[P(x)∧Q(x)∧R(x)]
- ∀x:[(Q(x)↔R(x))→P(x)]

No, the answer is incorrect.
Score: 0

Accepted Answers:
∀x:[P(x)→(Q(x)↔R(x))]

9) For which predicate(s) P(x,y) over the specified domain is the following statement false? (∀x∃y:P(x,y))→(∀z:P(z,z)) ***1 point***

- Domain is N, P(x,y): x is divisible by y
- Domain is N, P(x,y): x+y is prime
- Domain is R, P(x,y): x = y
- Domain is R, P(x,y): x > y

No, the answer is incorrect.
Score: 0

Accepted Answers:
Domain is N, P(x,y): x+y is prime
Domain is R, P(x,y): x > y

10) Choose the valid conclusions given the following premises: ***1 point***

∃x: [P(x)∧¬Q(x)]
∀x: [¬R(x)→¬P(x)]
∀x: [R(x)→S(x)].

- ∃x:R(x)
- ∃x:[S(x)∧¬Q(x)]
- ∀x:[S(x)∧¬Q(x)]
- ∀x:P(x)

No, the answer is incorrect.
Score: 0

Accepted Answers:
∃x:R(x)
∃x:[S(x)∧¬Q(x)]