Suffolk County Community College

Michael J. Grant Campus

Department of Mathematics

Thursday, May 17, 2018

MAT 101
A Survey of Mathematical Reasoning

Final Exam

Instructor:

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Please print the requested information in the spaces provided:

Student:

Name:

Student Id:

Email: *include to receive the final grade via email* ONLY *if you are not getting email updates*

- *Notes and books are permitted on this exam.*
- *Graphing calculators, computers, cell phones and any communication-capable devices are prohibited. Their mere presence in the open (even without use) is a sufficient reason for an immediate dismissal from this exam with a failing grade.*
- *You will not receive full credit if there is no work shown, even if you have the right answer. Use back pages if necessary. Please don't attach additional pieces of paper: if you run out of space, please ask for another blank final.*

Existential presupposition is in effect for "some x are y" statements. The proposition "some cats are smart" means that the universe of discourse contains at least one cat who is smart. Existential presupposition is not in effect for "all x are y" statements. The proposition "all unicorns are mammals" means that every unicorn existing in the universe of discourse must be a mammal, but it does not assume that unicorns exists.

Problem 1. Consider the argument: *People aren't dogs. Some people understand logic. Therefore, no dog understands logic.*

(1). Identify the assumption and the conclusion of this argument. (Use any necessary logical connectors that may be implicit.)

Space for your solution:

(2). What kind of an argument is this: propositional, syllogistic or predicate logic?

Space for your solution:

(3). Use the technique of analysis appropriate for this kind of an argument. (For a propositional argument: break it into atomic statements and logical connectors. For a syllogism: draw an Euler-Venn diagram and show the assumptions of this argument in the diagram. For a general first-order logic argument: determine objects, predicates and quantifiers, as well as atomic statements and logical connectors, that define the structure of this argument.)

Space for your solution:

(4). Give a reason why this argument is valid or provide a counterexample showing that the argument is invalid.

Space for your solution:

Problem 2. Consider the argument: *All unicorns are mammals. All mammals are animals. Therefore, some unicorns are animals.*

(1). Identify the assumption and the conclusion of this argument. (Use any necessary logical connectors that may be implicit.)

Space for your solution:

(2). What kind of an argument is this: propositional, syllogistic or predicate logic?

Space for your solution:

(3). Use the technique of analysis appropriate for this kind of an argument. (For a propositional argument: break it into atomic statements and logical connectors. For a syllogism: draw an Euler-Venn diagram and show the assumptions of this argument in the diagram. For a general first-order logic argument: determine objects, predicates and quantifiers, as well as atomic statements and logical connectors, that define the structure of this argument.)

Space for your solution:

(4). Give a reason why this argument is valid or provide a counterexample showing that the argument is invalid.

Space for your solution:

Problem 3. Consider the argument: *All unicorns are mammals. All mammals are animals. Therefore, all unicorns are animals.*

Give a reason why this argument is valid or provide a counterexample showing that the argument is invalid.

Space for your solution:

Problem 4. Consider the argument: *John or James was the murderer. James has an alibi for the time of the murder. Therefore John was the murderer.*

(1). Identify the assumption and the conclusion of this argument. (Use any necessary logical connectors that may be implicit.)

Space for your solution:

(2). What kind of an argument is this: propositional, syllogistic or predicate logic?

Space for your solution:

(3). Use the technique of analysis appropriate for this kind of an argument. (For a propositional argument: break it into atomic statements and logical connectors. For a syllogism: draw an Euler-Venn diagram and show the assumptions of this argument in the diagram. For a general first-order logic argument: determine objects, predicates and quantifiers, as well as atomic statements and logical connectors, that define the structure of this argument.)

Space for your solution:

(4). Give a reason why this argument is valid or provide a counterexample showing that the argument is invalid.

Space for your solution:

Problem 5. Consider the argument[1]: *The universe is a system of masses. Any finite system of masses has the barycenter. Any static system of masses with a barycenter is collapsed on its barycenter. If the universe were infinite and static, then every line of sight would end on some star, thus the night sky would be as bright as the sun. The universe is not collapsed. The night sky is not as bright as the sun. Therefore the universe is not static.*

(1). What kind of an argument is this: propositional, syllogistic or predicate logic?

Space for your solution:

(2). Use the technique of analysis appropriate for this kind of an argument. (For a propositional argument: break it into atomic statements and logical connectors. For a syllogism: draw an Euler-Venn diagram and show the assumptions of this argument in the diagram. For a general first-order logic argument: determine objects, predicates and quantifiers, as well as atomic statements and logical connectors, that define the structure of this argument.)

Space for your solution:

[1]See Olber's paradox in *A Brief History of Time* by Stephen Hawking, page 58.

(3). Give a reason why this argument is valid or provide a counterexample showing that the argument is invalid.

Space for your solution: