

Exam 1 Review

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This is a review for Exam 1 in Math 1030. It is longer than the actual exam, and might cover material that won't be on the exam due to time constraints.

1. Give an example of:
 - (a) A finite set.
 - (b) An infinite set.
 - (c) Two infinite sets whose overlap is *infinite*.
 - (d) Two infinite sets whose overlap is *finite*.
 - (e) Two infinite sets which don't overlap at *all*.
2. State what it means for a deductive argument to be *valid*. State what it means for a deductive argument to be *sound*. Given an example of:
 - (a) An inductive argument.
 - (b) A sound deductive argument.
 - (c) A valid deductive argument which is not sound.

3. Below is an argument. Identify if it is *inductive* or *deductive*. If it is inductive, how strong do you think it is? If it is deductive, is it valid, sound, or neither?

J. Harris wrote an algebra book.

R. Hartshorne wrote an algebra book.

T. Hungerford wrote an algebra book.

Thus every mathematician whose last name starts with “H” has written an algebra book.

4. You are on Mars, which has its own system of Martian units. You want to take a shuttle craft from Xenquat to Tarphen, which is a distance of 531 Parnocs. Your shuttle craft gets 41 Parnocs per Orsank of fuel. One Orsank of fuel costs 22 Roys. One Roy is \$3. How much money will you spend on fuel to make the trip?
5. Many employers ask job applicants to take a urinary drug test before they are hired. A quick Google search suggests that in these tests, 5% come back positive for an illegal drug.

For the sake of argument, let’s suppose we have a group of 10,000 people, of which 5% are using illegal drugs. Suppose the urinary drug exam is 99% accurate.

- (a) Of the people who are actually using illegal drugs, how many of them are correctly identified as users? How many of them are incorrectly identified as clean?
- (b) Of the people who are actually clean, how many of them are correctly identified as clean? How many of them are incorrectly identified as users?
- (c) How many people total will the test say are using drugs? What percentage of them are innocent?