

Patterns in Mathematics (012-01)
Second Exam
Spring 2015

Please do all work on this paper. Points are written to the left of each problem,

- 6 pts 1. Use De Morgan's Law to write a statement equivalent to the following.

$$\sim (\sim P \vee Q)$$

- 6 pts 2. Write the contrapositive of the following statement.

“If the sun is shining, then it is not hot.”

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- 20 pts 3. Let M be the statement “*I have a lot of money*” and let O be the statement “*I am old*”. Consider the following argument:

If I have a lot of money, then I am not old.

Either I don't have a lot of money or I am old.

Therefore I am old.

Use a truth table to determine the validity of this argument. (You will get no points for stating your conclusion without filling in the relevant truth table.)

M	O	
T	T	
T	F	
F	T	
F	F	

18 pts 4. A pair of dice, one red and one green, are tossed.

(a) List the elements of the sample space.

(b) What is the probability the number on the red die is larger than the number on the green die?

(c) What is the probability that the numbers on both dice are equal?

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16 pts 5. Thirteen students are in a room. Four of them are taking both a math class and a physics class. Six of them are taking a math class. Seven of them are taking a physics class. If you pick a student in the room at random, what is the probability that the student is taking exactly one of these two classes?

12 pts 6. A card is drawn from a standard 52 card deck. One card is drawn.

(a) What is the probability that card is a face card? (Face cards are Jacks, Queens, and Kings.)

(b) What are the odds in favor of that card being a face card?

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22 pts 7. An urn contains 3 red balls, two blue balls, and one green ball. Two balls are removed without replacement.

(a) What is the probability that at least one of them is green?

(b) What is the probability that both of them are green?

(c) What is the probability that neither of them is red?