

Math 104: Finite Mathematics

Fall 2002, Exam 2

This exam is meant to test your mastery of stuff we've done in class. If at any point it looks like I'm trying to trick you, or if it looks like you'd need something we haven't done, that's probably a clue that you're looking at it the wrong way. Of course, you're welcome to ask me if you have any questions about the statements of the problems.

Answer each question, *showing all work which is necessary to do the problem* (i.e. "my calculator says so" does not suffice). Answers may be left in the form of factorials, combinations, or permutations, or as products, sums, square roots, etc. of numbers unless otherwise noted.

1. (6 pts) Could this table be the probability distribution for something?

k	$Pr(X = k)$
1	0.33
2	0.67
3	-0.25
4	0.25

2. (12 pts) The probability that Matthew will go swimming today is 0.2, The probability that Julie will go swimming today is 0.8. Assuming the two events are independent, what is the probability that at least one of them will go swimming.
3. (24 pts) Amanda is looking at higher education opportunities for students in a certain rural school district. A certain sample of students has the following set of ACT scores: 18, 34, 18, 24, 22, 22, 19, 18, 26, 20, 17, 21.
- (a) Find the median score and the quartiles.
- (b) Find the probability that a randomly selected score was less than Q_2 . Could a different data set double this probability? Why?

4. (29 pts) Lauren and Jamie are opening a high-end restaurant. Of course, to be served in this restaurant, a steak must be absolutely excellent, and their butcher knows this. The probability of a given steak being suitable is 0.05. If it is not, the probability that the butcher will sell it to them anyway is 0.08. If the butcher sells the restaurant an inferior steak, the probability that the chef will catch it before serving it to a customer depends on how busy the restaurant is. On the busiest 20% of nights, the probability is 0.7. On all other nights, the probability is 0.9.
- (a) Draw a tree to represent this process.
 - (b) What is the probability that an inferior steak reaches the table?
 - (c) What is the probability that it is a busy night (in the top 20%) given that an inferior steak reaches the table?
5. (29 pts) Michelle takes work as a quality control inspector at Honeywell to make a little extra money. Each box that comes to her has 100 do-dads. If 6 of them are flawed and she tests 5 randomly selected do-dads from the box, observe the number of bad do-dads in the sample tested.
- (a) Write the sample space for this experiment.
 - (b) Write the probability distribution for this experiment.
 - (c) What is the probability that she finds at least 1 bad do-dad?
 - (d) What is the probability that she finds exactly 1 bad do-dad?