

QUIZ 2 (SECTION 4-6, CHAPTER 5)

MATH 119 – FALL 2012 – KUNIYUKI
105 POINTS TOTAL, BUT 100 POINTS = 100%

Show all work, simplify as appropriate, and use “good form and procedure” (as in class).
Box in your final answers!

No notes or books allowed. A scientific calculator is allowed.

You may detach the attached tables on the back and write on them, but turn them in with your test. Nothing you write on the tables will be graded.

DO NOT LEAVE P , C , OR FACTORIALS IN YOUR FINAL ANSWER. SIMPLIFY COMPLETELY! YOUR ANSWER TO EACH OF PROBLEMS 1) THROUGH 4) WILL BE AN INTEGER (A “SIMPLE NUMBER”). SHOW SOME WORK JUSTIFYING YOUR ANSWERS; DON’T JUST WRITE ANSWERS.

Note: None of these answers is “one” or “none.” Some people get confused by what these kinds of problems are asking!

- 1) (5 points). A math department has nine teachers. Bill Gates decides to give four of the teachers checks for \$1 million, but he doesn’t know which ones yet. If we only care about which teachers get the checks and which don’t, how many ways can he do this?

- 2) (5 points). Bill Gates’s (cheaper) rival is Gill Bates. Gill Bates also decides to give checks to four teachers in this math department of nine teachers. He will give one check for \$1000, one for \$500, one for \$250, and one for \$100. If we do care about which teachers get which checks, how many ways can he do this? (Assume that Gill doesn’t care how Bill gave out his checks.)

- 3) (5 points). Principal Evil wants to fire all nine math teachers one-by-one. How many possible orders are there for all nine math teachers to be fired?

- 4) (5 points). You need to select a password for the SkyNet computer system. A valid SkyNet password must consist of five characters, beginning with three uppercase English letters and ending with two digits. (There are 26 uppercase English letters, and there are ten digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.) Those are the only restrictions. How many possible valid SkyNet passwords are there?

5) (9 points). A cooties insurance policy costs \$50 for this year. If you catch cooties this year, you will receive a check for \$1000. If you do not catch cooties, you will receive nothing. There is a 4% chance that you catch cooties this year. If you decide to purchase this policy, what is the expected value of your change in wealth this year as a result?

IN THE FOLLOWING PROBLEMS, ROUND OFF YOUR FINAL ANSWERS TO THREE DECIMAL PLACES (OR GIVE AN EXACT ANSWER AS A DECIMAL), UNLESS OTHERWISE SPECIFIED. BEFORE YOU GIVE YOUR FINAL ANSWERS, GIVE EXACT NUMBERS IN YOUR CALCULATIONS OR ROUND THEM OFF TO AT LEAST FIVE SIGNIFICANT DIGITS.

6) (17 points total). A probability distribution is given below.

x	$P(x)$
5	0.412
10	0.579
15	0.009

a) Find the mean of this distribution. (5 points)

b) Find the standard deviation of this distribution. (12 points)

- 7) (24 points). X is a random variable that has as its probability distribution the binomial distribution $\text{Bin}(n = 4, p = 0.58)$. X counts the number of successes among the four trials. Describe this distribution by filling out the table below. Show all work! When rounding off calculations, do so to at least five significant digits, except round off your answers in the table to three decimal places.

x	$P(x)$
0	
1	
2	
3	
4	

- 8) (9 points). A multiple-choice test consists of ten questions, each with four options (A, B, C, and D). Each question has exactly one correct option. Assume that a student guesses randomly on all the questions; that is, each option is equally likely to be chosen by the student on any question. What is the probability that the student gets exactly four questions correct? Show work! Do **not** use Table A-1 for your work.

9) (10 points total). The seniors at a large high school take a standardized test, and 80% of them pass it. Some administration officials suspect that there was rampant cheating on the test at this school. Twelve seniors are randomly selected from this high school for a retest. Use Table A-1 (see the back of the test). Show work.

a) What is the probability that more than nine of the seniors taking the retest passed the test the first time? (5 points)

b) What is the probability that at least eleven of the seniors taking the retest passed the test the first time? (5 points)

10) (16 points total). Senator Suspicious thinks that the news reporters in his state are biased against him, compared to the voters in his state. A trusted poll shows that 55% of the registered voters in the state support Senator Suspicious. All 360 news reporters (all of whom are registered voters) in the state are briefly interviewed. Let X represent the number of Suspicious supporters in a randomly selected group of 360 registered voters in the state. In parts a) and b), treat X as a random variable.

a) Find the mean, or expected value, of X .

b) Find the standard deviation of X . As usual, round off your answer to three decimal places.

c) In fact, out of the 360 news reporters, 195 of them say that they support Senator Suspicious. What is the corresponding z score? Round off your answer to two decimal places.