MATH-1110 (DUPRÉ) FALL 2017 TEST 2 ANSWERS

1. PRINT YOUR LAST NAME IN THE UPPER RIGHT CORNER IN LARGE CAPITAL LETTERS.

2. PRINT YOUR FIRST NAME UNDERNEATH YOUR LAST NAME IN THE UPPER RIGHT CORNER IN CAPITAL LETTERS.

3. PRINT YOUR LAB DAY AND LAB START TIME UNDERNEATH YOUR FIRST NAME IN THE UPPER RIGHT CORNER.

4. WRITE YOUR MATH COURSE NUMBER AND SECTION NUMBER UNDERNEATH YOUR LAB DAY IN THE UPPER RIGHT CORNER.

PART I problems all use the information that follows. Suppose that you know the fish in LAKE WOBEGONE have population average length 2 feet with a standard deviation of 0.4 feet. Suppose you also know that the population average weight is 10 pounds with a standard deviation of 0.8 pounds. Suppose that the population correlation of length and weight of fish in LAKE WOBEGONE is 0.6. Assume all fish caught are caught in LAKE WOBEGONE.

5. You expect a fish to be caught later will weigh 10 pounds. What should you expect for the squared error for expecting the fish to weigh 10 pounds?

ANSWER: $(0.8)^2 = 0.64$

6. If someone else guesses the fish to be caught later will weigh 12 pounds, then what should you expect for the squared error of such a guess?

ANSWER: $(12 - 10)^2 + (0.8)^2 = 4.64$

7. If you are told a 2 foot fish was caught but cannot see it, what should you expect to be its weight, using simple linear regression?

ANSWER: 10 pounds

8. What should you expect for the weight in POUNDS of a fish which has a STANDARDIZED length score of 3, using simple linear regression?

ANSWER: $10 + (0.8)(0.6)(3) = 10 + 1.44 = 11.44$

9. What should you expect is the weight in pounds of a fish whose actual length is 3.2 feet, using simple linear regression?

ANSWER: $10 + (0.8)(0.6)[(3.2 - 2)/(0.4)] = 11.44$

10. When using length and simple linear regression to predict weight of fish in LAKE WOBEGONE, instead of simply predicting 10, what should you expect for the squared error in your prediction?

ANSWER: $(0.8)^2[1 - (0.6)^2] = (0.64)(0.64) = 0.4096$

PART II problems all use the information that follows. A box contains 10 RED blocks, 15 BLUE blocks, and 25 GREEN blocks. A lab assistant draws blocks from the box one after another either always with replacement or always without replacement, but you cannot see which because you are not in the room with him, but he keeps a written record of the results.

11. What is the probability that the third block drawn is RED?

ANSWER: $(10)/(50) = 1/5 = 0.2$

12. What is the probability that the third block drawn is RED given that the last 5 are RED and the lab assistant is drawing WITHOUT replacement?

ANSWER: $5/(45) = 1/9$

13. What is the probability that 4 of the first 20 blocks drawn are RED given the lab assistant is drawing WITHOUT replacement?

ANSWER: $C(10,4)C(40,16)/C(50,20)$

14. What is the probability that 4 of the first 20 blocks drawn are RED given the lab assistant is drawing WITH replacement?

ANSWER: $C(20,4)(1/5)^4(4/5)^{16}$

15. What is the VARIANCE in the number of RED blocks in the first 20 blocks drawn given the lab assistant is drawing WITH replacement?

ANSWER: $(20)(1/5)(4/5) = (16)/(5) = 3.2$

16. What is the VARIANCE in the number of RED blocks in the first 20 blocks drawn given the lab assistant is drawing WITHOUT replacement?

ANSWER:

$$\left(\frac{50-20}{50-1}\right)(20)\left(\frac{1}{5}\right)\left(\frac{4}{5}\right)$$
$$= \left(\frac{30}{49}\right)\left(\frac{16}{5}\right) = \frac{(6)(16)}{49} = \frac{96}{49}$$

PART III problems all use the information that follows. A mailman has 20 letters in his bag that are all addressed to different destinations. He is standing in front of a line of 20 mailboxes for an apartment complex, numbered 1 through 20. He decides to put all the letters in some or all of these mailboxes and quit for the day without looking at the addresses. The order of the letters he puts in any particular mailbox does not matter.

17. How many ways can he put all the letters in the same mailbox?

ANSWER: 20

18. How many ways can he put one letter in each mailbox?

ANSWER: $P(20, 20) = 20!$

19. How many ways can he put 5 letters in the first mailbox and the rest in the last mailbox?

ANSWER: $C(20, 5) = (20!)/[(5!)(15!)] = (48)(19) = 912$

20. How many ways can he put 5 letters in the first mailbox, 7 in the second mailbox, and 8 in the last mailbox?

ANSWER: $(20!)/[(5!)(7!)(8!)] = C(20, 5)C(15, 7)$