MATH-1230 (DUPRÉ) FALL 2010 TEST 2 ANSWERS

FIRST: PRINT YOUR LAST NAME IN LARGE CAPITAL LETTERS ON THE UPPER RIGHT CORNER OF THIS SHEET.

SECOND: PRINT YOUR FIRST NAME IN CAPITAL LETTERS DIRECTLY UNDERNEATH YOUR LAST NAME.

THIRD: WRITE YOUR FALL 2010 MATH-1110 LAB DAY DIRECTLY UNDERNEATH YOU FIRST NAME.

Suppose that a box contains 5 RED blocks, 4 GREEN blocks, and 6 BLUE blocks. A color blind lab assistant removes the blocks fromo the box one after another until the box is empty.

1. What is the chance that the last block removed is RED?

ANSWER: There are 15 blocks any one of which could be the last block and 5 of these are red, so

$$P(15^{th}R) = \frac{5}{15} = \frac{1}{3}.$$

FINAL ANSWER: 1/3

2. Given that the third block removed is RED, what is the chance that the second block removed is RED?

ANSWER: Given that the third block removed is red now means there are only 14 blocks whose fate remains unknown to us, and of those only 4 are red, so

$$P(2^{nd}R|3^{rd}R) = \frac{4}{14} = \frac{2}{7}.$$

FINAL ANSWER: 2/7

Suppose that X **is an unknown and that** A **is a statement about the value of** X. **Suppose that** $P(A) = .4$, **that** $E(X|A) = 7$, **and that** $E(X| \textit{ not } A) = 3$.

3. What is $E(XI_A)$**?**

ANSWER: The MULTIPLICATION RULE tells us

$$E(XI_A) = E(X|A)P(A) = (7)(.4) = 2.8$$

FINAL ANSWER: 2.8

4. What is $E(X)$**?**

ANSWER: Let $B = \textit{ not } A$ **so we know** $I_A + I_B = 1$. **Therefore**

$$X = XI_A + XI_B.$$

By the MULTIPLICATION RULE, just as in the previous problem but now applied to B **instead of** A, **and using** $P(B) = 1 - P(A) = 1 - .4 = .6$, **we find**

$$E(XI_B) = E(X|B)P(B) = (3)(.6) = 1.8.$$

Putting this together with the result of the previous problem we now find

$$E(X) = E(XI_A) + E(XI_B) = 2.8 + 1.8 = 4.6$$

FINAL ANSWER 4.6

Suppose that W **and** Y **are unknowns with correlation coefficient** $\rho = .4$ **Suppose also that** $\sigma_W = 8$ **and** $\sigma_Y = 10$.

5. What is the covariance of W **and** Y**, that is, what is** $Cov(W, Y)$**?**

ANSWER: We know by definition that

$$\rho = \frac{Cov(W, Y)}{\sigma_W \sigma_Y}$$

and therefore

$$Cov(W, Y) = \rho \sigma_W \sigma_Y = (.4)(8)(10) = (4)(8) = 32.$$

FINAL ANSWER: 32