University of Puerto Rico at Aguadilla
Department of Mathematics
Statistics with Computer Skills
Examination II

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Section: _____

Instructions: Please solve each one of the exercises of the possible clearest form. Make an interpretation of the numerical results.

1. Based on data from the *Statistical Abstract of the United States*, 112th Edition, only about 17% of senior citizens (65 years old or older) get the flu each year. However, about 22% of the people under 65 years old get the flu each year. In the general population, there are 11% senior citizens (65 years old or older).

(a) What is the probability that a person selected at random from the general population is senior citizen who will get the flu this season? (Use 3 decimal places.)

(b) What is the probability that a person selected at random from the general population is a person under age 65 who will get the flu this year? (Use 3 decimal places.)

2. Diagnostic tests of medical conditions can have several types of results. The test result can be positive or negative, whether or not a patient has the condition. A positive test (+) indicates that the patient has the condition. A negative test (−) indicates that the patient does not have the condition. Remember, a positive test does not prove the patient has the condition. Additional medical work may be required. Consider a random sample of 200 patients, some of whom have a medical condition and some of whom do not. Results of a new diagnostic test for the condition are shown.

	Condition Present	Condition Absent	Row Total
Test Result +	104	26	130
Test Result −	22	48	70
Column Total	126	74	200

Assume the sample is representative of the entire population. For a person selected at random, compute the following probabilities. (Use 3 decimal places.)

(a) $P(+ \mid \text{condition present})$; this is known as the *sensitivity* of a test.

(b) $P(- \mid \text{condition present})$; this is known as the *false-negative rate*.

(c) $P(- \mid \text{condition absent})$; this is known as the *specificity* of a test.

(d) $P(+ \mid \text{condition absent})$; this is known as the *false-positive rate*.

(e) $P(\text{condition present } \textit{and} +)$; this is the *predictive value* of the test.

(f) $P(\text{condition present } \textit{and} -)$.

3.There are nine wires which need to be attached to a circuit board. A robotic device will attach the wires. The wires can be attached in any order, and the production manager wishes to determine which order would be fastest for the robot to use. Determine the number of possible sequences of assembly that must be tested.

4. One professor grades homework by randomly choosing 7 out of 11 homework problems to grade.
STEP 1: How many different groups of 7 problems can be chosen from the 11 problems?

STEP 2: *Probability extension:* Jerry did only 7 problems of one assignment. What is the probability that the problems he did comprised the group that was selected to be graded? (Use 4 decimal places.)

STEP 3: Silvia did 9 problems. How many different groups of 7 did she complete?

STEP 4: What is the probability that one of the groups of 7 she completed comprised the group selected to be graded? (Use 4 decimal places.)

5. Barbara is a research biologist for Green Carpet Lawns. She is studying the effects of fertilizer type, temperature at time of application, and water treatment after application. She has three fertilizer types, two temperature zones, and four water treatments to test. Determine the number of different lawn plots she needs in order to test each fertilizer type, temperature range, and water treatment configuratio

6. A meteorologist says that the probability of rain on Saturday is 30%, the probability of rain on Sunday is 25% and the chance of rain both days is 20%. What is the probability of rain during the weekend?

7. Use the spreadsheet Exh_tabl.MTW. Use the Height column (height in inches) vs Weight (weight in lbs)

a) Calculate the Peason correlation coefficient.

b) Find the simple linear regression line.

c) Make an analysis of residuals. Exite normal variability constant and influential data.

d) Estimate the weight for a person of 72 inches.

Bono (10 pts) False Positives And Positive Fallacies

1. Explain the two daughters problem. Why knowing that one is called Florida, the problem change?

2. Leonard Mlodinow he tested positive for HIV explain why.

3. Explain the case of Sally Clark.