Concordia University
Department of Economics

ECON 221 – Sections C, D, CC

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Winter 2016 – ASSIGNMENT 1
Due on February 12, 2016

Name: **I.D.**   **Section:**

1. A manufacturer of network computer server systems is interested in improving the customer support service. As a first step, its marketing department has been charged with the responsibility of summarizing the extent of customer problems in terms of system downtime. The 40 most recent customers were surveyed to determine the amount of downtime in hours they had experienced in the previous month. The survey data are shown below.
   [The calculations and the graph for this exercise must be done in Excel. With the data on class intervals and frequencies that are shown below, you will create a table in Excel with the necessary detailed column calculations that will be used as a basis to answer sub-questions (a), (b) and (c). You will paste your table here.] (15 points)

Downtime Ranges	# Clients (Frequency) f_i
0 - 10	10
10 - 20	12
20 - 30	8
30 - 40	4
40 - 50	3
50 - 60	2
60 - 70	1

   a) Construct a cumulative frequency distribution, and a cumulative relative frequency distribution. (3 points)

   b) Using the appropriate formula for grouped data, calculate the mean number of hours in downtime. Use the table provided above for your computations. (4 points)

   c) Using the appropriate formulas for grouped data, calculate the variance and the standard deviation. Use the table provided above for your computations. (4 points)

d) Using Excel, draw a histogram of the frequencies and paste it in the space provided below. Make a rough assessment about symmetry in the data and the implication for the size of the mean. (4 points)

2. In a new poll with regard to the future of the Canadian Senate, 70% of the respondents indicated that they would like to have a vote with respect to the upper chamber's future. Furthermore, 50% of the respondents said that they would like to see the Senate abolished, while 40% of the respondents said that they would like it to be kept as is. (10 points)

a) If keeping the Senate or abolishing it represents two mutually exclusive events, what is the probability that a randomly chosen respondent would belong to either of the two groups? (3 points)

b) If abolishing the Senate and voting for its future are statistically independent events, what is the probability that a randomly chosen respondent would be in favour of either abolishing the Senate or voting for its future? (3 points)

c) Of the respondents who were in favour of keeping the Senate, 70% said that they would like to vote on it. What is the probability that a randomly chosen respondent would be in favour of either keeping the Senate or voting for its future? (4 points)

3. A student feels that 70% of his university courses have been enjoyable and the remainder have been boring. This student had access to student evaluations of professors and finds out that professors who had previously received positive evaluation have taught 80% of his enjoyable courses and 20% of his boring courses. (13 points)

a) Construct a table or a tree diagram of joint probabilities. (4 points)

b) What is the probability that a randomly chosen course will either be given by a professor with positive evaluation or it will be enjoyable (or both)?   (3 points)

c) What is the probability that a professor with negative evaluation will give an enjoyable course? (3 points)

d) Are the teacher evaluations and the quality of courses statistically independent? (3 points)

4. A jury of 12 members is to be selected from a panel consisting of 8 men and 8 women. The qualities of the candidates are comparable, so the final selection will be made through a ballot. (14 points)

   a. What is the probability that all of the 8 women will be included in the 12-member jury? (3 points)

   b. What is the probability that the jury will be evenly divided from the gender point of view? (3 points)

   c. What is the probability that, in the jury, women will have a majority status? (4 points)

   d. Assume that just before the ballot, one man withdraws from the panel because of unexpected illness. How would the probability of having all women included in the 12-member jury, that was calculated in (a) above, be modified? (4 points)

5. In the game of blackjack as played in casinos, the dealer has the advantage as most of the players do not play very well. As a result, the probability that the average player wins a hand is about 40%. An average player decides to play 10 hands. (12 points)

    a. What is the probability that he will win in all hands? (3 points)

    b. What is the probability that he will not win any hand at all? (3 points)

    c. What is the average number of hands that an average player should expect to win in a 10-hand game? (3 points)

    d. What is the probability that he will win at least 1 hand? (3 points)

6. The number of accidents in a production facility has a Poisson distribution with mean 2 per month. (8 points)

    a. What is the probability that in a particular month there will be less than two accidents? (4 points)

b. What is the probability that within a two-month period there will be less than two accidents? (4 points)

7. Your uncle has asked you to analyze his stock portfolio, which contains 6 shares of stock A and 8 shares of stock B. The joint probability distribution of the stock prices is shown below: (18 points)

		Price of Stock A - X Variable			
		40	50	60	70
Price of Stock B — Y Variable	45	0.00	0.05	0.10	0.10
	50	0.05	0.05	0.05	0.10
	55	0.05	0.05	0.10	0.05
	60	0.10	0.10	0.05	0.00

a. Find the average price and variance of stock A. (3 points)

b. Find the average price and variance of stock B. (3 points)

c. Find the covariance and correlation coefficient of the prices of the two stocks. (5 points)

d. Find the average value of the entire portfolio. (2 points)

e. Find the standard deviation of the value of the entire portfolio and calculate a 68% range of its value. (5 points)

8. The scores of all applicants taking an aptitude test required by a law school follow a normal distribution with mean 420 and standard deviation 100. (10 points)

   a. What is the probability that a randomly selected applicant will score less than 450 in this test? (3 points)

   b. What is the probability that two randomly (and independently) selected applicants will both score less than 450 in this test? (3 points)

   c. What is the probability that out of two randomly (and independently) selected applicants, at least one will score less than 450 in this test? (4 points)