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ID Number _____

Concordia University
Department of Economics

Econ 221

Fall 1999

MID-TERM EXAMINATION

Indicate the best answer in each case on the examination question paper.

1. In a sample space S , two events A and B are said to be mutually exclusive if
 - a) $P(A|B) = 0$
 - b) $P(A \cap B) = P(A) + P(B)$
 - c) $P(A|B) = P(A) P(B)$
 - d) a) and b) but not c)
 - e) a), b) and c)

2. In a sample space S , two events A and B are said to be independent if
 - a) $P(A|B) = 0$
 - b) $P(A \cap B) = P(A) + P(B)$
 - c) $P(A|B) = P(A) P(B)$
 - d) a) and b) but not c)
 - e) a), b) and c)

Question 3 - 7 are based on the following example. A firm is bidding for a contract to repair old cable conduits in Montreal. Cable size (y) is either 4 cm or 9 cm in diameter and cable is buried at a depth of either 1,2 or 4 m below ground. City records summarizing the joint distribution x and y over the area of the contract yield the following table:

		Size of cable in cm: y	
		4	9
Depth in m: x	1	.24	.16
	2	.12	.08
	4	.24	.16

3. The conditional probability that a randomly selected section of cable for repair will be buried 2 m deep, given that it is 9 cm cable is
- .15
 - .35
 - .20
 - .25
 - .08
4. Let the event A be $x = 2$, the event B be $x = 4$ and the event C be $y = 9$. The $P([A \cap B] | C)$ is
- .12
 - .20
 - .40
 - .34
 - .24
5. The variance of x is
- 1.96
 - 7.60
 - 5.20
 - 1.84
 - None of the above
6. $E[y | x = 2]$ is equal to
- 1.0
 - 6.0
 - 5.5
 - 3.6
 - 2.9
7. The covariance of x and y is
- .24
 - .34
 - .40
 - 1.60
 - None of the above

8. The variance of $(3x - 4y)$ is
- a) 12.56
 - b) 224.13
 - c) 115.27
 - d) 112.56
 - e) None of the above

A recent Nobel Prize in Economic Science was awarded for contributions to the theory of games. As a test of knowledge in the area the population of Concordia Professors of Economics were examined in the theory of games and the following population scores emerged as equally likely: 3, 5, 9, 11, 17.

9. The mean μ and the variance σ^2 of the population of test scores are
- a) 10 and 32
 - b) 9 and 30
 - c) 10 and 16
 - d) 9 and 24
 - e) None of the above
10. If a particular test score is x_i ($i = 1, 2, \dots, 5$) the mean and variance of the $z_i = (5x_i - 5)$, $i = 1, 2, \dots, 5$, are
- a) 22 and 750
 - b) 35 and 378
 - c) 35 and 600
 - d) 40 and 600
 - e) None of the above
11. The mean and variance of $w = \{(z - 40) / \sqrt{600}\}$ in question 10 are
- a) 1 and 0
 - b) 5 and 0
 - c) 5 and 1
 - d) 0 and 1
 - e) None of the above
12. Three trucking firms [United (U) Allied(A) and Integrated(I)] make all deliveries of lots to a

warehouse. 20% are delivered by U and 40% by I. If a lot is delivered by U, the probability that more than 3% of its contents are defective is .01 and, if delivered by A or I, the corresponding probabilities are .02 and .025. A lot is delivered and later found to contain more than 3% defectives. The probability that this lot was delivered by U is

- a) .05
 - b) .10
 - c) .13
 - d) .40
 - e) None of the above
13. An ordinary deck of cards is thoroughly shuffled and 4 cards are selected (without replacement). The probability that exactly 3 of the 4 cards will be diamonds is
- a) .0443
 - b) .0051
 - c) .0536
 - d) .0042
 - e) .0412
14. There are 10 red balls and 20 black balls in an urn. These are thoroughly mixed and 5 balls are selected without replacement. The probability that three are black and two are red is
- a) .35998
 - b) .00108
 - c) .25969
 - d) .15998
 - e) None of the above
15. If in question 14 selection had been with replacement, then the same probability would have been
- a) .34615
 - b) .32922
 - c) .33911
 - d) .44100
 - e) None of the above

ECON221 Practice Final Exam 1999

November 1999

B. Dong

Student name and ID _____

Note: This practice final does not reflect exam committee's point of view, on either the material, difficulty level or format of the actual final exam.

Instructions. (1. no cheating in real test please; 2. calculators are allowed, other materials are not; 3. Z, t, F, χ^2 tables are supplied).

1. Multiple choices (10 questions which worth a total 20%).
2. A produce firm in Ontario regularly ships fruit and vegetables to a Great Lake Distribution Centre. It uses its own trucks, and each round trip follows an identical route — a distance more than 1500 kilometres. Owing to minor variations in each trip, the actual distance varies. In an audit of ten randomly selected trips, the exact distance is recorded and are 1569, 1581, 1567, 1580, 1571, 1570, 1578, 1568, 1557, 1559. On the basis of this sample, find a 99% confidence interval for the mean kilometres per trip over all such truck shipments.
3. The second question (all subquestions are independent from each other).
 - a. Prove that the expected variance of sample variance is $\frac{2\sigma^4}{n-1}$, where σ is population standard error and n is sample size.
 - b. How would you proceed a sampling procedure from a given population in TSP? How would you calculate the sample variance? Write down a short TSP input program about it.
 - c. What is type I error and type II error? What is confidence level and significance level of a test? What is the power of the test?
 - d. Determine a 98% confidence interval for the variance of the distribution of ages of bank presidents based on the sample information, $n = 20$ and $s = 8$ years, sample mean is 64.
4. In question 1, an auditor is interested in estimating the variance of the population. Using the same sample of size 10, establish the 95% confidence interval for the population variance.
5. (Significance of the test and power of the test)
 - a. A firm in Quebec manufactures staples. The null hypothesis is that when the production process is working correctly, the number of staples in each strip(x) has a mean of $\mu = 1,000$, with a standard deviation of 37.5. This variable is presumed to have an approximately normal distribution. The alternative hypothesis is that the mean of x is $\mu_1 = 970$. Given a sample with sample size being 9, find acceptance region for null hypothesis when the significance level is .10 and power of the test.
 - b. Would you change the acceptance region of the null hypothesis when sample size is 20, given $\alpha = 0.10$? Find the acceptance region of null hypothesis when the significance level is .05 and the power of the test in (b), given sample size is 20.