MSIN0017: Business Analytics

MOCK EXAMINATION PAPER

The final examination will last **two** hours.

There are **two** parts to the examination paper.

Answer **ALL** questions in Part A and Part B. The questions from Part A count for 32 marks' and Part B for 68 marks. The total is 100 marks. The value of each question is provided in square brackets. **Please do read the instruction for each part carefully.**

IMPORTANT NOTES: This is a **closed-book' closed-notes** exam. Laptops' mobile devices' and any electronic communications devices are NOT permitted. However' **you are allowed to take one-page two-sided A4 paper with anything you would like to write**. Calculators are permitted.

Part A - Answer all questions by indicating the correct answer from the choices given. There is no need to show work. The value of each question is provided in square brackets.

A-1. Which of the following statements is **not always** correct?

A. The standard deviation measures the variability of a random variable or a data set

B. The coefficient of variation has the same unit as the variance

C. The mean is a measure of the central tendency of a distribution

D. *R* squared measures the strength of a linear relationship

A-2. We have the following four statements:

a) The expected value and the mean of a random variable are the same.

b) Normal distribution that is thinner and taller has a high variance.

c) The 95% confidence interval for the true population mean μ tells us that the random variable μ falls within the confidence interval with probability 0.95.

d) *R* squared is the proportion of variation in the dependent variable that has been explained by regression.

How many of these statements are true?

A. 0 B. 1 C. 2 D. 3 E. 4

A-3. US Airways has sold 25 tickets for one of its flights from Phoenix to London. Experience with this flight has shown that each ticket holder has a probability of 0.2 of not showing up for the flight (ticket holders' decisions are independent). Let X be a binomial random variable describing the number of ticket holders who will *not* show up for the flight.

(a) What is the expected value of X?

A. 14 B. 5 C. 6 D. 15

(b) What is the probability that X is equal to or greater than 8?

A. 0.109 B. 0.891 C. 0.047 D. 0.780

A-4. According to the weight-for-age percentile chart developed by the National Center for Health Statistics' the average weight for a five-year-old girl is 40 lbs. Assume that weights follow a normal distribution.

(a) If 95% weight level is given as 42 lbs. (i.e.' 95% five-year-old girls weigh less than or equal to 42 lbs.)' what is the standard deviation used in this percentile chart?

A. 1.22 B. 1.96 C. 2.44 D. 2.56

(b) Now assume that the standard deviation is 4 lbs. With this assumption' what is the probability that a randomly selected five-year-old girl weighs less than 36 lbs.?

A. 0.08 B. 0.16 C. 0.43 D. 0.67

A-5. Let A and B be two companies. Assume that the expected return of company A is equal to the expected return of company B' and that the variance of the returns of A is four times larger than the variance of the returns of company B. Then the return-to-risk ratio of company A is:

A. four times smaller than the return-to-risk ratio of company B.

B. two times smaller than the return-to-risk ratio of company B.

C. four times larger than the return-to-risk ratio of company B.

D. two times larger than the return-to-risk ratio of company B.

A-6. Assume that the mean of a population is μ' and that its standard deviation is σ. If the sample size' n' is larger than 30' then which one of the following is correct:

A. the sample data's distribution tends to a normal distribution with mean μ and standard deviation $\sigma/\sqrt{n}$

B. the sample mean's distribution tends to a normal distribution with mean μ and standard deviation $\sigma/\sqrt{n}$.

C. the sample data's distribution tends to a normal distribution with mean μ and standard deviation σ/n

D. the sample mean's distribution tends to a normal distribution with mean μ and standard deviation σ/n

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Part B - Answer all questions. YOU MUST SHOW ALL YOUR WORK. CLEARLY INDICATE YOUR FINAL ANSWER. The value of each question is provided in square brackets.

B-1. Returns on a certain business venture' to the nearest $1'000' are known to follow the probability distribution given in the table.

X	-2000	-1000	0	1000	2000	3000
P(X)	0.1	0.1	0.2	0.2	0.3	0.1

a. What is the most likely monetary outcome of the business venture?

b. Is the venture likely to be successful? Explain.

c. What is the long-term average earning of business ventures of this kind?

d. What is a good measure of the risk involved in a venture of this kind? Why? Compute this measure.

B-2. Imagine that you are a restaurant manager.

a. Each day' 15 people come to your restaurant for lunch. The probability that each diner orders pizza as a main course is 0.6. Assume that the customers' orders are independent' and that each customer orders only one main course. What is the probability that the number of pizzas ordered during a single lunch is 12? Explain the notation you use and show all your work.

The main ingredients of a basic (Margherita) pizza are flour' cheese' and tomato sauce. Assume that each pizza contains 250 gr flour and 150 gr cheese. The price of a pack of 500gr of flour has mean £0.5 and variance £0.1. The price of a pack of 150gr cheese has mean £1 and variance £0.24. Assume that the price of tomato sauce is £0.5 and that all prices are normally distributed and independent.

b. Find the distribution of the total price of the main ingredients of a basic pizza. Report the distribution's mean and standard deviation.

c. What is the probability that the total price of the main ingredients of a basic pizza is higher than £2.8? What is the probability that the total price of the main ingredients of a basic pizza is higher than £2.8?

B-3. The U.S. Census Bureau announced that the mean sales price of new houses sold in March 2006 was $279,100. Assume that the standard deviation of the prices is $90,000, and you select a random sample of n = 100.

a. what is the probability that the sample mean will be less than $250,000?

b. construct 95% confidence interval for the sample mean.

c. construct 80% confidence interval for the sample mean.

d. compare the two confidence intervals from b and c. Which one is larger and why?

B-4. This question pertains to regression analysis. The marketing manager at the Dean Dome is interested in estimating the demand function for concert t-shirts. He obtains the following data regarding the sales (in hundreds) of t-shirts at various prices:

Sales	47	42	47	31	36	58	38	35	38	32	61	46
Price	11	15	13	19	16	12	16	18	18	20	13	14

R	R Square	Adj. R Sqr	St. Err of Est	df	F	p-value
0.846	0.715	0.686	5.384	10	25.084	0.0005

Variable	Coeff.	Std. Err	t-value	p-value
Constant	85.709	8.750	9.796	0.0000
Price	-2.797	0.559	-5.008	0.0005

a) Write out the regression equation relating sales as a function of price.

b) Is the coefficient for the Price (the 'Beta') significantly different from zero?

c) What does the Price 'Beta' tell us?

d) Construct a 95% prediction interval for the change in expected sales' i.e. 'Beta'' when the price is increased by £1.