



**UNIVERSITI KUALA LUMPUR
BUSINESS SCHOOL**

**FINAL EXAMINATION
MARCH 2024 SEMESTER**

COURSE CODE : EGB10103
COURSE NAME : ECONOMIC STATISTICS 1
PROGRAMME NAME : BACHELOR OF SCIENCE (HONS) ANALYTICAL ECONOMICS
DATE : 10 JULY 2024
TIME : 2.00 PM – 5.00 PM
DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **FIVE (5)** questions.
4. Answer **ALL** questions.
5. Please write your answers on the answer booklet provided.
6. Please write your name and Student ID at every page of your answer sheet.
7. All questions must be answered in **English** (any other language is not allowed).
8. This question paper must not be removed from the examination hall.

THERE ARE FIVE (5) PAGES OF QUESTIONS, INCLUDING THIS PAGE.

(Total: 100 marks)**Question 1**

- (a) A doctor has three examination rooms. There are six patients in the waiting room. Determine how many ways can the patients be assigned to the examination rooms.
(3 marks)
- (b) Given six digits 1,2,3,4,5 and 6.
i) Determine the number of four-digit numbers that can be formed using the digits given if no repetition is allowed.
(3 marks)
ii) Calculate how many ways four-digit numbers greater than 4,000 can be formed using the digits given without repetition.
(3 marks)
- (c) There are 12 people entering a room where there are only 10 chairs. Calculate how many ways can two people be chosen to remain standing.
(3 marks)
- (d) In a business course in a college, 90% of the students passed Mathematics, 95% of the students passed Management and 88% of the students passed both Mathematics and Management.
i) Draw a Venn diagram for the above conditions.
(3 marks)
ii) A student is selected at random, compute the probability that the student passed Mathematics or Management.
(3 marks)
iii) A student is selected at random, determine the probability that the student passed neither Mathematics nor Management.
(2 marks)

Question 2

Three companies, A, B and C, are competing for a contract to build a condominium. The probabilities that companies A, B and C will win the contract are 0.25, 0.45 and 0.3 respectively. If company A, B and C win the contract, the probability that they will make profits are 0.8, 0.9 and 0.7 respectively.

- (a) Construct a tree diagram based on the information given in the question.
(10 marks)
- (b) Determine the probability that the companies will make profit.
(5 marks)
- (c) If the contract is found to be profitable, calculate the probability that the contract was given to company A.
(5 marks)

Question 3

- (a) Let Z be a standard normal random variable, and determine the following probabilities.
 - i) Probability that Z is less than 0.63.
 - ii) Probability that Z is between -0.84 and 0.93 .
(4 marks)
- (b) In the 2008 Wimbledon tennis tournament, Rafael Nadal averaged 115 miles per hour (mph) on his first serves. Assume that the distribution of his first serve speeds is Normal with a mean of 115 mph and a standard deviation of 6 mph.
 - i) Calculate proportion of his first serves would you expect to exceed 120 mph.
(3 mark)
 - ii) Determine the percent of Rafael Nadal's first serves are between 100 and 110 mph.
(3 mark)
- (c) Many country have programs for assessing the skills of students in English Language. Malaysian University English Test (MUET) is one such program. In a recent year 76,531 first year Malaysian university students took the exam. The mean score was 572 and the standard deviation was 51. Assuming that these scores are approximately normally distributed
 - i) Give the z -score for a student who received a score of 600.
(2 marks)

- ii) Find the proportion of students who have scores less than 600. Find the proportion of students who have scores greater than or equal to 600.

Sketch the relationship between these two calculations using pictures of Normal curves.

(5 marks)

- iii) What score is needed to be in the top 5%?

(3 marks)

Question 4

- (a) A manufacturer claims that only 10% of his machines require repair within one year. Calculate the probability of 5 repairs from 20 machines. Use the Binomial formula to determine the probability of 5 repairs (i.e. successes) in 20 trials of the experiment.

(4 marks)

- (b) During one stage in the manufacture of integrated circuit chips, a coating must be applied. If 70% of the chips receive a thick enough coating, find the probabilities that among 15 chips:

i) at least 12 will have a thick enough coating

(4 marks)

ii) at most 6 will have a thick enough coating

(4 marks)

iii) exactly 10 will have a thick enough coating

(3 marks)

- (c) Suppose Harry Potter and Ron Weasley are on the Hogwarts Express, and Harry buys a box of Bertie Bott's every flavor bean from the lunch trolley. Let's assume this box contains ten beans flavors. There are six tasty flavors and four yucky flavors. Harry decides to share the box with his friend Ron. So, Ron reaches in and randomly selects five beans and eats them. Determine the chance that Ron chooses the two yucky flavors.

(5 marks)

Question 5

- (a) The waiting time at a bus stop is uniformly distributed between 1 and 12 minute.

i) Determine the probability density function.

(2 marks)

ii) Calculate the probability that the rider waits 8 minutes or less.

(3 marks)

- (b) In a certain Binomial distribution with probability of success, $p = 0.2$ and number of trials $n = 30$. By using the normal approximation to binomial distribution, compute the probability of getting 5 successes.

(6 marks)

- (c) The time spent waiting between events is often modeled using the exponential distribution. For example, suppose that an average of 30 customers per hour arrive at a store and the time between arrivals is exponentially distributed.

i) On average, determine how many minutes elapse between two successive arrivals.

(2 marks)

ii) After a customer arrives, calculate the probability that it takes less than one minute for the next customer to arrive.

(3 marks)

iii) After a customer arrives, calculate the probability that it takes more than five minutes for the next customer to arrive.

(4 marks)

END OF EXAMINATION PAPER

FORMULAS AND STATISTICAL TABLE

NORMAL DISTRIBUTION

$$z = \frac{X - \mu}{\sigma}$$

$$\text{Standard error of the mean} = \frac{s}{\sqrt{n}}$$

$$\left(\bar{x} - a \frac{\sigma}{\sqrt{n}}, \bar{x} + a \frac{\sigma}{\sqrt{n}} \right) \text{ where}$$

$$a = 1.96 / 1.645 / 2.58$$

Probability Distributions

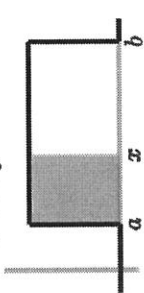
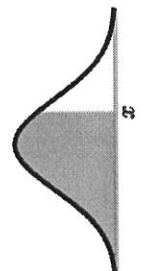
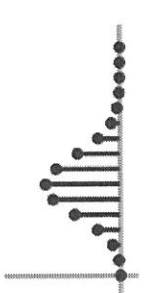
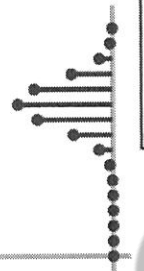
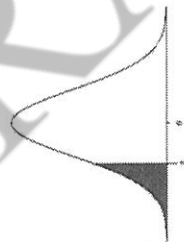
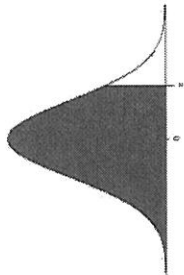
	Continuous			Key
	Uniform	Exponential	Normal	
Discrete	 $\mu = \frac{a+b}{2} \quad \sigma = \sqrt{\frac{(b-a)^2}{12}}$ $P(X < x) = \frac{x-a}{b-a}$	 $\mu = \frac{1}{\gamma} \quad \sigma = \frac{1}{\gamma}$ $P(X < x) = 1 - e^{-\gamma x}$	 $z = \frac{x - \mu}{\sigma}$ $P(X < x) \Rightarrow \text{Use Z-Chart}$	$\gamma = \text{rate parameter}$ $z = \text{z-score}$ $p = \text{probability of success}$ $n = \# \text{ of trials}$ $N = \text{population size}$ $K = \# \text{ of success states}$
	 $\mu = n \cdot p \quad \sigma = \sqrt{n \cdot p \cdot (1-p)}$ $P(X = x) = \binom{n}{x} p^x (1-p)^{n-x}$	 $\mu = \frac{1}{p} \quad \sigma = \frac{\sqrt{1-p}}{p}$ $P(X = x) = (1-p)^{x-1} p$	 $\mu = n \frac{K}{N} \quad \sigma = \sqrt{n \frac{K(N-K)(N-n)}{N^2(N-1)}}$ $P(X = x) = \frac{\binom{K}{x} \binom{N-K}{n-x}}{\binom{N}{n}}$	

Table of Standard Normal Probabilities for Negative Z-scores



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

Table of Standard Normal Probabilities for Positive Z-scores



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5198	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

Note that the probabilities given in this table represent the area to the LEFT of the z-score.

The area to the RIGHT of a z-score = 1 - the area to the LEFT of the z-score