King Saud University

College of Business Administration

Quantitative Analysis Department (QUA)

Quantitative Methods for Decision Making

QUA 553

MIDTERM EXAM Duration: 90 min.

Name:

Student ID:

Q#	1	2	3	4	5	6	7	8	9	10	11	12
Answer												
Q#	13	14	15	16	17	18	19	20	21	22	23	---
Answer												

Note:

- THE EXAM CONSISTS OF 23 QUESTIONS AND 12 PAGES.
- ANSWER ALL THE QUESTIONS AND PLACE THEM IN THE TABLE ABOVE.
- CIRCLE ONE ANSWER FOR EACH QUESTION.
- SHOW ALL YOUR CALCULATIONS.
- USE THE EXAM PAGES TO SOLVE THE QUESTIONS.
- YOU CAN'T BORROW ANYTHING FROM ANY STUDENT.

1. The main purpose of descriptive statistics is to:

   A) Summarize data in a useful and informative manner.
   B) Make inferences about a population.
   C) Determine if the data adequately represents the population.
   D) Gather or collect data

2. Which of the following is an example of a continuous variable?

   A) Family income
   B) Number of students in a statistics class
   C) Zip codes of shoppers
   D) Rankings of baseball teams in a league

3. The incomes of a group of 50 loan applicants are obtained. Which level of measurement is income?

   A) Nominal
   B) Ordinal
   C) Interval
   D) Ratio

4. A questionnaire contained a question regarding marital status. The respondent checked either single, married, divorced, separated or widowed. What is the scale of measurement for this question?

   A) Ratio
   B) Interval
   C) Ordinal
   D) Nominal

Use the following to answer questions 5-7:

Refer to the following distribution of ages:

Ages	Number
40 up to 50	10
50 up to 60	28
60 up to 70	12

5. For the distribution of ages above, what is the relative class frequency for the lowest class?

A) 50%
B) 18%
C) 20%
D) 10%

6. What is the class interval?

A) 9
B) 10
C) 10.5
D) 11

7. What is the class midpoint of the highest class?

A) 54
B) 55
C) 64
D) 65

8. A sample of 9 companies revenue in billion riyals is given by:

8.3	5.9	4.8	4.1	3.4	3.6	2.5	2.7	6.7

The mean and standard deviation of the companies revenue are:

(a) $\bar{X} = 2.50$, $s = 3.82$
(b) $\bar{X} = 3.82$, $s = 4.67$
(c) $\bar{X} = 4.67$, $s = 1.95$
(d) $\bar{X} = 42.0$, $s = 2.54$

9. The net annual sales of a sample of small retail clothing stores were organized into the following relative frequency distribution.

Net Sales (in $ millions)	Percent of Total
1 up to 4	13
4 up to 7	14
7 up to 10	40
10 up to 13	23
13 or more	10

What is the mean net sales (in $ millions)?

A) $7.09
B) $10.09
C) $8.59
D) $8.325

10. In a scatter diagram, we describe the relationship between

A) two variables measured at the ordinal level
B) two variables, one measured as an ordinal variable and the other as a ratio variable
C) two variables measured at the interval or ratio level
D) a variable measure on the interval or ratio level and time

11. What statistics are needed to draw a box plot?

A) Minimum, maximum, median, first and third quartiles
B) Median, mean and standard deviation
C) A median and an interquartile range
D) A mean and a standard deviation

12. When are two events mutually exclusive?

A) They overlap on a Venn diagram
B) If one event occurs, then the other cannot
C) Probability of one affects the probability of the other
D) Both (a) and (b)

Use the following to answer questions 13-15:

Each salesperson in a large department store chain is rated on their sales ability and their potential for advancement. The data for the 500 sampled salespeople are summarized in the following table.

		Potential for Advancement		
		Fair	Good	Excellent
Sales Ability	Below Average	16	12	22
	Average	45	60	45
	Above Average	93	72	135

13. What is the probability that a salesperson selected at random has above average sales ability and is an excellent potential for advancement?

A) 0.20
B) 0.50
C) 0.27
D) 0.75

14. What is the probability that a salesperson selected at random will have average sales ability and good potential for advancement?

A) 0.09
B) 0.12
C) 0.30
D) 0.525

15. What is the probability that a salesperson selected at random will have below average sales ability and fair potential for advancement?

A) 0.032
B) 0.10
C) 0.16
D) 0.32

16. In a large metropolitan area, past records revealed that 30 percent of all the high school graduates go to college. From 20 graduates selected at random, what is the probability that exactly 8 will go to college?

A) 0.114
B) 0.887
C) 0.400
D) 0.231

Use the following to answer questions 17-19:

A statistics professor receives an average of five e-mail messages per day from students. Assume the number of messages approximates a Poisson distribution.

17. What is the probability that on a randomly selected day she will have no messages?

A) 0.0067
B) zero
C) 0.0335
D) Impossible to have no messages

18. What is the probability that on a randomly selected day she will have five messages?

A) 0.0067
B) 0.875
C) 0.175
D) 1.0

19. What is the probability that on a randomly selected day she will have two messages?

A) 0.0067
B) 0.0014
C) 0.420
D) 0.084

use the following to answer 20-23:

Married men were asked to specify which type of saving they used. The following table shows the 100 responses cross-classified by educational level of the respondent.

saving method	*Educational Level*			
	High School (A)	*College (B)*	*Graduate School (C)*	Total
S	*15*	*8*	*7*	30
T	*3*	*7*	*20*	30
V	*5*	*5*	*15*	25
W	*10*	*3*	*2*	15
Total	*33*	*23*	*44*	100

20. The probability that a randomly selected man will be using saving method V :

(a) 0.05 (b) 0.25 (c) 0.33 (d) 0.20 (e) 0.15

21. The probability that a randomly selected man will have College :

(a) 0.08 (b) 0.07 (c) 0.23 (d) 0.05 (e) 0.03

22. The probability that a randomly selected man will be using saving method T or have High School is:

(a) 0.30 (b) 0.33 (c) 0.09 (d) 0.60 (e) 0.10

23. The probability that a randomly selected man will be using saving method **W** and have Graduate School is:

(a) 0.02 (b) 0.10 (c) 0.44 (d) 0.13 (e) 0.05

With my best wishes.

Formulae

SAMPLE MEAN $$\bar{X} = \frac{\Sigma X}{n}$$ [3–2]

GEOMETRIC MEAN $$GM = \sqrt[n]{(X_1)(X_2)\cdots(X_n)}$$ [3–4]

MEAN DEVIATION $$MD = \frac{\Sigma|X - \bar{X}|}{n}$$ [3–7]

SAMPLE STANDARD DEVIATION $$s = \sqrt{\frac{\Sigma(X - \bar{X})^2}{n - 1}}$$ [3–11]

CHEBYSHEV'S THEOREM For any set of observations (sample or population), the proportion of the values that lie within k standard deviations of the mean is at least $1 - 1/k^2$, where k is any constant greater than 1.

$$1 - \frac{1}{k^2} = 1 - \frac{1}{(3.5)^2} = 1 - \frac{1}{12.25} = 0.92$$

ARITHMETIC MEAN OF GROUPED DATA $$\bar{X} = \frac{\Sigma fM}{n}$$ [3–12]

where:

- $\bar{X}$ is the designation for the sample mean.
- M is the midpoint of each class.
- f is the frequency in each class.
- fM is the frequency in each class times the midpoint of the class.
- ΣfM is the sum of these products.
- n is the total number of frequencies.

STANDARD DEVIATION, GROUPED DATA $$s = \sqrt{\frac{\Sigma f(M - \bar{X})^2}{n - 1}}$$ [3–13]

where:

- s is the symbol for the sample standard deviation.
- M is the midpoint of the class.
- f is the class frequency.
- n is the number of observations in the sample.
- $\bar{X}$ is the designation for the sample mean.

LOCATION OF A PERCENTILE $$L_p = (n + 1)\frac{P}{100}$$ [4–1]

PEARSON'S COEFFICIENT OF SKEWNESS $$sk = \frac{3(\bar{X} - \text{Median})}{s}$$ [4–2]

CLASSICAL PROBABILITY $$\text{Probability of an event} = \frac{\text{Number of favorable outcomes}}{\text{Total number of possible outcomes}}$$ [5-1]

GENERAL RULE OF MULTIPLICATION $P(A \text{ and } B) = P(A)P(B|A)$ [5-6]

P(A or B) = P(A) + P(B) - P(A and B)

$P(A) = 1 - P(\sim A)$.

BAYES' THEOREM $$P(A_i|B) = \frac{P(A_i)P(B|A_i)}{P(A_1)P(B|A_1) + P(A_2)P(B|A_2)}$$ [5–7]

PERMUTATION FORMULA $$_nP_r = \frac{n!}{(n-r)!}$$ [5–9]

COMBINATION FORMULA $$_nC_r = \frac{n!}{r!(n-r)!}$$ [5–10]

MEAN OF A PROBABILITY DISTRIBUTION $\mu = \Sigma[xP(x)]$ [6–1]

VARIANCE OF A PROBABILITY DISTRIBUTION $\sigma^2 = \Sigma[(x-\mu)^2P(x)]$ [6–2]

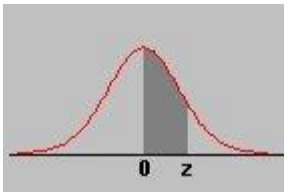
BINOMIAL PROBABILITY FORMULA $P(x) = {}_nC_x\,\pi^x(1-\pi)^{n-x}$

$$P(x) = \frac{({}_SC_x)({}_{N-S}C_{n-x})}{{}_NC_n}$$

POISSON DISTRIBUTION $$P(x) = \frac{\mu^x e^{-\mu}}{x!}$$ [6–7]

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

Area between 0 and z



	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0	0	0.004	0.008	0.012	0.016	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.091	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.148	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.17	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.195	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.219	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.258	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.291	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.334	0.3365	0.3389
1	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.377	0.379	0.381	0.383
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.398	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.437	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.475	0.4756	0.4761	0.4767
2	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.483	0.4834	0.4838	0.4842	0.4846	0.485	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.489
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.492	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.494	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.496	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.497	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.498	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.499	0.499