P2

TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MECHANICAL, ELECTRICAL, BUILDING AND CIVIL ENGINEERING

YEAR 3 SEMESTER I

AMA 2350: ENGINEERING MATHEMATICS V

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Sep2018

Question One (30 Marks)

a) Highlight the main steps in hypothesis testing (4 Marks)

b) The following is number of customers reporting a power outage in 56 days in a small KPLC office.

18 27 23 29 22 28

32 32 36 15 18

20 31 32 18 27 36 15 21

22 33 16 20

From the data develop a frequency distribution table with a class width of 5 (5 mks)

Hence calculate the mean (5 marks)

c) How many possible ways of forming a committee of 3 people from 5 people [3mks]

d) The variable $x \sim N(80,20)$, evaluate $P(60 \leq x \leq 120)$ [5mks]

e) A company makes electric motors. The probability an electric motor is not defective is 0.96. What is the probability that a sample of 100 electric motors will contain exactly 4 defective motors considering the distribution of defectives follow a:

I) poisson distribution (4mks)

II) binomial distribution (4mks)

QUESTION TWO (20MKS)

a) State the properties of a binomial distribution (3mks)

b) A fair coin is tossed six times, what's the probability of getting more than 3 heads (4mks

c) A variable has been established to follow the standard normal distribution. Determine the probability that a value for this variable will lie

i) Between 0 and 1.44

ii) Between -1.2 and 2.3

(4 marks)

d) If a fair coin is tossed 10 times, what's the probability of getting between two and 8 heads inclusive [6mks]

Question Three(20 Marks)

a) The data below show the number of minutes it takes a new mechanic to repair a tire in a garage in a university garage

10 14 18 28 12 22 24 26 33 24 26 40 22 20 44

Calculate the:

i) Variance and Standard deviation (5mks)

ii) Construct the 95% confidence interval of the mean (5mks)

iii) From the previous experience, the mean and standard deviation of tire repair is 18 minutes with a standard deviation of 10minutes. Can it be claimed that the new mechanic is slower at 5%siggnificant level? (5mks)

b) If 2% of the electric bulbs manufactured by a company are defective, use Poisson distribution to find the probability that in a sample of 100 bulbs less than 3 are defective (5Marks)

Question Four(20 Marks)

a) A random variable X is defined as the number of heads in simultaneous toss of three coins.

i) Obtain the probability distribution of X

ii) Calculate expected value (mean) of X

iii) Variance of X

(4 Marks)

b) A variable is normally distributed with mean of 400. In the past it has been established that 20% of the variable values fall below 380.

i) Determine the standard deviation (5mks)

i) Percent of the values will lie between 385 and 480 (6Marks)

ii) Percentage that lie below 510 (5 marks)

Question Five (20 Marks)

a) Ali and Otieno appear in an interview for two vacancies in the same post. The probability of Ali's selection is 0.40 and that of otieno's selection is 0.25 If their selection is independent of each other what is the probability that:

i) Both of them will not be selected? [3mks]

ii) Only one of them is selected? [3mks]

b) A random variable *X* has the following distribution

x	1	2	3	4	5
P(x)	0.05	0.10	0.15	0.45	0.25

Calculate;

I. The expected value of X, E(X) (3mks)

II. The variance δ^2 of X (3mks)

c) State the conditions necessary to conduct a

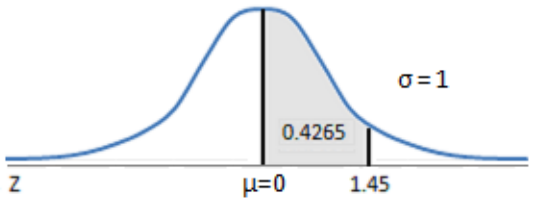
i. A one sample t test

ii. A z test

iii. A two sample t test (8mks)

Areas Under the One-Tailed Standard Normal Curve

This table provides the area between the mean and some Z score.
For example, when Z score = 1.45 the area = 0.4265.



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	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	0.0910	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	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	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	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	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	0.3340	0.3365	0.3389
1.0	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	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	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	0.4370	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	0.4750	0.4756	0.4761	0.4767
2.0	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	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
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	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	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	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	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	0.4980	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	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000