MULTIMEDIA UNIVERSITY

STUDENT ID NO

TABLE NO:

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER MARCH/APRIL 2024 - (TRIM ID: 2410)

CMT1134 – MATHEMATICS III

(Foundation in Information Technology)

12 JULY 2024
9.00 a.m.- 11.00 a.m.
(2 Hours)

Questions	Marks
1	
2	
3	
4	
5	
6	
Total	50

INSTRUCTIONS TO STUDENT

1. This question paper consists of 16 pages excluding the cover page.
2. Attempt **ALL SIX** questions. The distribution of the marks for each question is given.
3. Please write all your answers on the space provided. All necessary working steps **MUST** be shown.
4. You are required to write proper steps to obtain maximum marks.

Question 1 [5 marks]

a) Find $\sum_{k=1}^{38}(5+3k)$. [3 marks]

b) Find the term containing x^5 in the expansion of $(y-2x)^{12}$.
Simplify your answer to the simplest form.
[2 marks]

Solution:

Continued...

Question 2 [10 marks]

Solve the system of linear equations using Gauss-Jordan Elimination method.
[Note: No mark will be given if you solve using any other methods.]

$$x-2y+z=5$$
$$-2x+3y+3z=0$$
$$3x+5y-z=7$$

[10 marks]

Solution:

Continued...

Question 3 [5 marks]

a) Given vectors $\boldsymbol{a} = \langle 3,7,5 \rangle$ and $\boldsymbol{b} = \langle -2,3,1 \rangle$.

i) Find $4\boldsymbol{a} - 2\boldsymbol{b}$.

ii) Hence, find $|4\boldsymbol{a} - 2\boldsymbol{b}|$. Give your answer correct to 2 decimal places.

[2 marks]

Solution:

b) Find the angle between the planes $2x + 3y - 2z = 9$ and $x + 2y - z = 8$.
Use Dot Product.

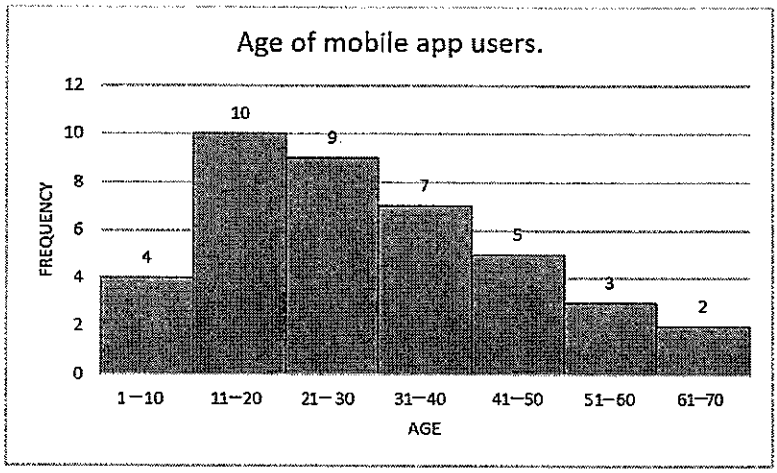
[3 marks]

Solution:

Continued...

Question 4 [10 marks]

a) The histogram given below represent the age of all 40 mobile apps users in a small room.



i) Construct a frequency distribution table that has class limits, frequencies and all necessary columns.

ii) Calculate the mean. Leave your answer correct to 1 decimal place.

iii) Calculate the median. Leave your answer correct to 1 decimal place.

iv) Calculate the mode. Leave your answer correct to 2 decimal places.

v) Calculate the standard deviation. Leave your answer correct to 2 decimal places.

[10 marks]

Continued...

Solution:

Continued...

Blank page, write your solution here.

Continued...

Question 5 [10 marks]

a) Diagram below shows 5 letters and 3 digits.

S	U	K	A	N	7	8	9

A code which consists of 3 letters followed by 2 digits is formed by using the above letters and digits without repetition. Find the number of different codes can be formed if

i) no condition is imposed.

ii) the last digit must be odd.

[2 marks]

Solution:

Continued...

b) A group of 5 students are to be chosen from 9 boys and 7 girls to form a school Mathematics quiz team. Find the number of different ways to form a team consists of

i) girls only.

ii) at least 4 boys.

[3 marks]

Solution:

c) The probabilities of Fateen and Adriana are chosen to join the school debate team are $\frac{1}{3}$ and $\frac{2}{5}$ respectively. Find the probability that

i) Fateen or Adriana is chosen and not both.

ii) both of them are not chosen.

[3 marks]

Continued...

Solution:

d) Given $P(A)=0.65$, $P(B)=0.4$, and $P(A\cup B)=0.7$.
Given the events A and B are not independent events, find

i) $P\left[(A\cup B)'\right]$.

ii) $P(A\cap B)$.

[2 marks]

Solution:

Continued...

Question 6 [10 marks]

a) A test consisting of 40 multiple choice questions. The probability of guessing a correct answer for each questions is $\frac{1}{4}$. Given the event of guessing the correct answer is binomially distributed, find the mean, variance and standard deviation of the distribution.

[2.5 marks]

Solution:

Continued...

b) The probability that a badminton player wins in a match is 0.8. This player is scheduled to play 6 matches. Find the probability that this player

i) wins exactly 4 matches.

ii) wins at least 4 matches.

[3.5 marks]

Solution:

Continued...

c) The weight of catfishes from a lake is normally distributed with a mean of 900g and a standard deviation of 30g. A catfish from the lake is selected at random. Find the probability that the mass of the catfish is

i) less than 920g.

ii) between 870g and 930g.

[4 marks]

Solution:

End of Question.

PMT0301: FORMULAE

$$a_n = a+(n-1)d \qquad a_n = ar^{n-1}$$

$$S_n = \frac{n}{2}\left[2a+(n-1)d\right] \qquad S_n = \frac{a\left(1-r^n\right)}{1-r}$$

$${}^nP_r = \frac{n!}{(n-r)!}$$

$${}^nC_r = \frac{n!}{(n-r)!r!}$$

$$A^{-1} = \frac{1}{|A|}C^T$$

$$A^{-1} = \frac{1}{|A|}\text{adj } A$$

$$\mathbf{u}\cdot\mathbf{v} = |\mathbf{u}||\mathbf{v}|\cos\theta \qquad |\mathbf{u}\times\mathbf{v}| = |\mathbf{u}||\mathbf{v}|\sin\theta$$

$$\mu = \frac{\sum x}{N} = \frac{\sum mf}{\sum f} \quad ; \quad \bar{x} = \frac{\sum x}{n} = \frac{\sum mf}{\sum f}$$

$$\sigma^2 = \frac{\sum x^2 - \frac{\left(\sum x\right)^2}{N}}{N} = \frac{\sum m^2 f - \frac{\left(\sum mf\right)^2}{N}}{N}$$

$$s^2 = \frac{\sum x^2 - \frac{\left(\sum x\right)^2}{n}}{n-1} = \frac{\sum m^2 f - \frac{\left(\sum mf\right)^2}{n}}{n-1}$$

$$\text{Mode} = L + \left[\frac{f_m - f_B}{(f_m - f_B) + (f_m - f_A)}\right] c$$

$$\text{Median} = L + \left[\frac{\left[\frac{\sum f}{2}\right] - F_L}{f_m}\right] c$$

Additive Rule : $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

Complementary Events : $P(A) + P(A') = 1$

Conditional Probability : $P(B/A) = \frac{P(A \cap B)}{P(A)}$, $P(A) > 0$

Multiplicative Rule : $P(A \cap B) = P(B/A)P(A)$

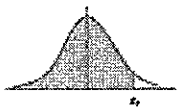
Independent Events : $P(A \cap B) = P(A)P(B)$

$P(X = x) = {}^{n}C_x p^x q^{n-x}$, $x = 0,1,2,3,...,n$

$P(X = x) = \frac{\lambda^x e^{-\lambda}}{x!}$, $x = 0,1,2,3,...$

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

Standard Normal Distribution



$$p(z \le z_1) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_1} e^{-\frac{1}{2}z^2} dz$$

The Normal Distribution Function

x	Φ(x)	x	Φ(x)	x	Φ(x)	x	Φ(x)
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591
0.25	0.5987	0.75	0.7734	1.25	0.8944	1.75	0.9599
0.26	0.6026	0.76	0.7764	1.26	0.8962	1.76	0.9608
0.27	0.6064	0.77	0.7794	1.27	0.8980	1.77	0.9616
0.28	0.6103	0.78	0.7823	1.28	0.8997	1.78	0.9625
0.29	0.6141	0.79	0.7852	1.29	0.9015	1.79	0.9633
0.30	0.6179	0.80	0.7881	1.30	0.9032	1.80	0.9641
0.31	0.6217	0.81	0.7910	1.31	0.9049	1.81	0.9649
0.32	0.6255	0.82	0.7939	1.32	0.9066	1.82	0.9656
0.33	0.6293	0.83	0.7967	1.33	0.9082	1.83	0.9664
0.34	0.6331	0.84	0.7995	1.34	0.9099	1.84	0.9671
0.35	0.6368	0.85	0.8023	1.35	0.9115	1.85	0.9678
0.36	0.6406	0.86	0.8051	1.36	0.9131	1.86	0.9686
0.37	0.6443	0.87	0.8078	1.37	0.9147	1.87	0.9693
0.38	0.6480	0.88	0.8106	1.38	0.9162	1.88	0.9699
0.39	0.6517	0.89	0.8133	1.39	0.9177	1.89	0.9706
0.40	0.6554	0.90	0.8159	1.40	0.9192	1.90	0.9713
0.41	0.6591	0.91	0.8186	1.41	0.9207	1.91	0.9719
0.42	0.6628	0.92	0.8212	1.42	0.9222	1.92	0.9726
0.43	0.6664	0.93	0.8238	1.43	0.9236	1.93	0.9732
0.44	0.6700	0.94	0.8264	1.44	0.9251	1.94	0.9738
0.45	0.6736	0.95	0.8289	1.45	0.9265	1.95	0.9744
0.46	0.6772	0.96	0.8315	1.46	0.9279	1.96	0.9750
0.47	0.6808	0.97	0.8340	1.47	0.9292	1.97	0.9756
0.48	0.6844	0.98	0.8365	1.48	0.9306	1.98	0.9761
0.49	0.6879	0.99	0.8389	1.49	0.9319	1.99	0.9767
0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772

x	Φ(x)	x	Φ(x)	x	Φ(x)	x	Φ(x)
2.00	0.97725	2.50	0.99379	3.00	0.99865	3.50	0.99977
2.01	0.97778	2.51	0.99396	3.01	0.99869	3.51	0.99978
2.02	0.97831	2.52	0.99413	3.02	0.99874	3.52	0.99978
2.03	0.97882	2.53	0.99430	3.03	0.99878	3.53	0.99979
2.04	0.97932	2.54	0.99446	3.04	0.99882	3.54	0.99980
2.05	0.97982	2.55	0.99461	3.05	0.99886	3.55	0.99981
2.06	0.98030	2.56	0.99477	3.06	0.99889	3.56	0.99981
2.07	0.98077	2.57	0.99492	3.07	0.99893	3.57	0.99982
2.08	0.98124	2.58	0.99506	3.08	0.99896	3.58	0.99983
2.09	0.98169	2.59	0.99520	3.09	0.99900	3.59	0.99983
2.10	0.98214	2.60	0.99534	3.10	0.99903	3.60	0.99984
2.11	0.98257	2.61	0.99547	3.11	0.99906	3.61	0.99985
2.12	0.98300	2.62	0.99560	3.12	0.99910	3.62	0.99985
2.13	0.98341	2.63	0.99573	3.13	0.99913	3.63	0.99986
2.14	0.98382	2.64	0.99585	3.14	0.99916	3.64	0.99986
2.15	0.98422	2.65	0.99598	3.15	0.99918	3.65	0.99987
2.16	0.98461	2.66	0.99609	3.16	0.99921	3.66	0.99987
2.17	0.98500	2.67	0.99621	3.17	0.99924	3.67	0.99988
2.18	0.98537	2.68	0.99632	3.18	0.99926	3.68	0.99988
2.19	0.98574	2.69	0.99643	3.19	0.99929	3.69	0.99989
2.20	0.98610	2.70	0.99653	3.20	0.99931	3.70	0.99989
2.21	0.98645	2.71	0.99664	3.21	0.99934	3.71	0.99990
2.22	0.98679	2.72	0.99674	3.22	0.99936	3.72	0.99990
2.23	0.98713	2.73	0.99683	3.23	0.99938	3.73	0.99990
2.24	0.98745	2.74	0.99693	3.24	0.99940	3.74	0.99991
2.25	0.98778	2.75	0.99702	3.25	0.99942	3.75	0.99991
2.26	0.98809	2.76	0.99711	3.26	0.99944	3.76	0.99992
2.27	0.98840	2.77	0.99720	3.27	0.99946	3.77	0.99992
2.28	0.98870	2.78	0.99728	3.28	0.99948	3.78	0.99992
2.29	0.98899	2.79	0.99736	3.29	0.99950	3.79	0.99992
2.30	0.98928	2.80	0.99744	3.30	0.99952	3.80	0.99993
2.31	0.98956	2.81	0.99752	3.31	0.99953	3.81	0.99993
2.32	0.98983	2.82	0.99760	3.32	0.99955	3.82	0.99993
2.33	0.99010	2.83	0.99767	3.33	0.99957	3.83	0.99994
2.34	0.99036	2.84	0.99774	3.34	0.99958	3.84	0.99994
2.35	0.99061	2.85	0.99781	3.35	0.99960	3.85	0.99994
2.36	0.99086	2.86	0.99788	3.36	0.99961	3.86	0.99994
2.37	0.99111	2.87	0.99795	3.37	0.99962	3.87	0.99995
2.38	0.99134	2.88	0.99801	3.38	0.99964	3.88	0.99995
2.39	0.99158	2.89	0.99807	3.39	0.99965	3.89	0.99995
2.40	0.99180	2.90	0.99813	3.40	0.99966	3.90	0.99995
2.41	0.99202	2.91	0.99819	3.41	0.99968	3.91	0.99995
2.42	0.99224	2.92	0.99825	3.42	0.99969	3.92	0.99996
2.43	0.99245	2.93	0.99831	3.43	0.99970	3.93	0.99996
2.44	0.99266	2.94	0.99836	3.44	0.99971	3.94	0.99996
2.45	0.99286	2.95	0.99841	3.45	0.99972	3.95	0.99996
2.46	0.99305	2.96	0.99846	3.46	0.99973	3.96	0.99996
2.47	0.99324	2.97	0.99851	3.47	0.99974	3.97	0.99996
2.48	0.99343	2.98	0.99856	3.48	0.99975	3.98	0.99997
2.49	0.99361	2.99	0.99861	3.49	0.99976	3.99	0.99997
2.50	0.99379	3.00	0.99865	3.50	0.99977	4.00	0.99997