

SULIT



KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI

JABATAN TEKNOLOGI MAKLUMAT & KOMUNIKASI

PEPERIKSAAN AKHIR

SESI II : 2024/2025

DFC30323: STATISTICS AND PROBABILITY

TARIKH : 23 MEI 2025

MASA : 8.30 PAGI – 10.30 PAGI (2 JAM)

Kertas soalan ini mengandungi **LAPAN BELAS (18)** halaman bercetak.

Bahagian A: Objektif (30 soalan)

Bahagian B: Struktur (2 soalan)

Dokumen sokongan yang disertakan : Formula

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

SULIT

SECTION A : 45 MARKS
BAHAGIAN A : 45 MARKAH

INSTRUCTION:

This section consists of **THIRTY (30)** objective questions. Mark your answers in the OMR form provided.

ARAHAN :

*Bahagian ini mengandungi **TIGA PULUH (30)** soalan objektif. Tandakan jawapan anda di dalam borang OMR yang disediakan.*

CLO1

1. Identify a random variable that assumes a finite or countably infinite number of values.

Kenal pasti pemboleh ubah rawak yang mengandaikan bilangan nilai terhitung atau tidak terhitung.

- A. Discrete random variable/*Pemboleh ubah rawak diskret*
- B. Irregular random variable/*Pemboleh ubah rawak tidak teratur*
- C. Continuous random variable/*Pemboleh ubah rawak berterusan*
- D. Special random variable/*Pemboleh ubah rawak istimewa*

CLO1

2. Select an example that are **NOT** of continuous random variable.

*Pilih contoh yang **TIDAK TERGOLONG** dalam kategori pemboleh ubah berterusan.*

- A. Waiting time for a server response
Masa menunggu untuk pelayan bertindak balas
- B. Lifetime of a battery
Jangka hayat bateri
- C. Number of bugs found in a software module
Bilangan pepijat ditemui dalam modul perisian
- D. Code execution time
Masa pelaksanaan kod

- CLO1 3. Identify the term that represents the expected value of a random variable.
Kenal pasti istilah yang mewakili nilai jangkaan bagi pemboleh ubah rawak.
- A. Mean/ *Min*
 - B. Variance/*Varian*
 - C. Standard Deviation/*Sisihan Piawai*
 - D. Mean Deviation/*Min Sisihan*
- CLO1 4. Select the mean and variance for the standard normal distribution.
Pilih min dan varian bagi taburan normal piawai.
- A. Mean is 0 and variance is ∞
Min ialah 0 dan varians ialah ∞
 - B. Mean is 0 and variance is 1
Min ialah 0 dan varians ialah 1
 - C. Mean is 1 and variance is 0
Min ialah 1 dan varians ialah 0
 - D. Mean is ∞ and variance is 0
Min ialah ∞ dan varians ialah 0
- CLO1 5. Select the characteristic of a binomial distribution below.
Pilih ciri taburan binomial di bawah.
- A. The trials are dependent on each other
Percubaan adalah bergantung antara satu sama lain
 - B. The number of trials is infinite
Bilangan percubaan ialah tidak terhingga
 - C. There are two possible outcomes for each trial
Terdapat dua kemungkinan hasil untuk setiap percubaan
 - D. The probability of success changes with each trial
Kebarangkalian kejayaan berubah dengan setiap percubaan

CLO1

6. Determine the value of $(5\ 2)$.

Tentukan nilai bagi $(5\ 2)$.

- A. 10
- B. 12
- C. 15
- D. 20

CLO1

7. A factory employs 100 workers, with 80% skilled in a specific skill. If we have to randomly select 10 workers, select the **CORRECT** distribution you would use to predict the number of trained workers in the group.

*Sebuah kilang menggaji 100 pekerja, dengan 80% mahir dalam kemahiran tertentu. Jika kita perlu memilih 10 pekerja secara rawak, pilih taburan yang **BETUL** yang akan anda gunakan untuk meramalkan bilangan pekerja terlatih dalam kumpulan tersebut.*

- A. Normal Distribution / *Taburan Normal*
- B. Poisson Distribution / *Taburan Poisson*
- C. Binomial Distribution / *Taburan Binomial*
- D. Exponential Distribution / *Taburan Eksponen*

CLO1

8. Given the probability distribution for a discrete random variable X as Table A8.

Diberi taburan kebarangkalian bagi pemboleh ubah rawak diskret X seperti Jadual A8 berikut:

Table A8 / *Jadual A8*

X	1	2	3	4
$P(X)$	0.2	0.3	0.4	0.1

Determine the mean (μ) of X .

Tentukan nilai min (μ) bagi X .

- A. 2.1
- B. 2.4
- C. 3.0
- D. 3.4

CLO1

9. Identify the **TRUE** characteristics for the Poisson distribution.
*Kenal pasti ciri-ciri yang **BENAR** bagi taburan Poisson.*
- A. The trials are independent, and the number of successes is fixed
Percubaannya adalah bebas, dan bilangan kejayaan telah ditetapkan
 - B. The probability of success is constant over time
Kebarangkalian kejayaan adalah tetap dari semasa ke semasa
 - C. The outcomes follow a binomial distribution
Hasilnya mengikuti taburan binomial
 - D. The events occur in fixed intervals, and the mean number of events is constant
Peristiwa berlaku dalam selang tetap, dan bilangan purata peristiwa adalah malar

CLO1

10. Identify the application below that is **NOT** from the normal distribution.
*Kenal pasti aplikasi di bawah yang **BUKAN** daripada taburan normal.*
- A. Heights of individuals in a population
Ketinggian individu dalam populasi
 - B. Number of calls received by a call center per hour
Bilangan panggilan yang diterima oleh pusat panggilan setiap jam
 - C. IQ scores in a population
Skor IQ dalam populasi
 - D. Measurement errors in scientific experiments
Ralat sukatan dalam eksperimen saintifik

CLO1

11. Identify conditions for using the normal approximation to the binomial distribution.

Kenal pasti keadaan yang membenarkan penggunaan penghampiran normal kepada taburan binomial.

- A. When the mean and variance have an equal probability of success.
Apabila min dan varians mempunyai kebarangkalian kejayaan adalah sama
- B. When the number of trials is small and probability of success is large
Apabila bilangan percubaan adalah kecil dan kebarangkalian kejayaan adalah besar
- C. When the binomial distribution is symmetric and the standard deviation is 0
Apabila taburan binomial adalah simetri dan sisihan piawai ialah 0
- D. When the number of trials is large and probability of success is near 0.5
Apabila bilangan percubaan adalah besar dan kebarangkalian kejayaan adalah hampir 0.5

CLO1

12. Bank tellers serve 30 customers per hour, and customer arrivals follow a random pattern. Select the **MOST APPROPRIATE** probability distribution that should be used to model the number of customers arriving per minute.

*Juruwang bank melayani 30 pelanggan setiap sejam dan ketibaan pelanggan adalah berbentuk rawak. Pilih taburan kebarangkalian yang **PALING SESUAI** digunakan bagi memodelkan bilangan pelanggan yang tiba setiap seminit.*

- A. Poisson Distribution / Taburan Poisson
- B. Binomial Distribution / Taburan Binomial
- C. Geometric Distribution / Taburan Geometrik
- D. Normal Distribution / Taburan Normal

CLO1

13. A factory produces cell phones with a 5% defect rate. If 200 cell phones are tested, identify the expected number of damaged cell phones assuming a normal estimate.

Sebuah kilang mengeluarkan telefon bimbit dengan kadar kecacatan 5%. Jika 200 telefon bimbit diuji, kenal pasti bilangan jangkaan telefon bimbit yang rosak dengan mengandaikan anggaran biasa.

- A. 5
- B. 10
- C. 15
- D. 20

CLO1

14. Indicate the observed value of a Z-score of +2.5 in a normal distribution.

Nyatakan nilai cerapan bagi skor $Z + 2.5$ dalam taburan normal.

- A. Unrelated to the mean
Tidak berkaitan dengan min
- B. Exactly at the mean
Tepat pada min
- C. 2.5 standard deviations above the mean
2.5 sisihan piawai melebihi min
- D. 2.5 standard deviations below the mean
2.5 sisihan piawai di bawah min

CLO1

15. A fair coin is flipped 100 times. Predict the probability of receiving at least 55 heads when applying the normal approximation to the binomial distribution.

Sekeping syiling telah dilambung sebanyak 100 kali. Ramalkan kebarangkalian menerima sekurang-kurangnya 55 permukaan kepala apabila menggunakan anggaran biasa kepada taburan binomial.

- A. Compute Z using $X = 50$
Kira Z dengan nilai $X = 50$
- B. Compute Z using $X = 50.5$
Kira Z dengan nilai $X = 50.5$
- C. Compute Z using $X = 54.5$
Kira Z dengan nilai $X = 54.5$
- D. Compute Z using $X = 55.5$
Kira Z dengan nilai $X = 55.5$

CLO1

16. In a coin flip experiment, the probability of receiving heads is $p = 0.5$. Identify the probability of getting exactly 2 heads if you flip a coin 4 times using binomial formula.

Dalam eksperimen lambungan syiling, kebarangkalian menerima permukaan kepala ialah $p = 0.5$. Kenal pasti kebarangkalian untuk mendapat 2 permukaan kepala jika anda membaling syiling sebanyak 4 kali menggunakan formula binomial.

- A. 0.05
- B. 0.25
- C. 0.35
- D. 0.375

CLO1

17. If the average number of accidents per year is 6, compute the probability of having exactly 2 accidents in a year using the Poisson formula.

Jika purata kemalangan setahun adalah 6, kira kebarangkalian berlaku 2 kemalangan setahun menggunakan formula Poisson.

- A. 0.0446
- B. 0.6568
- C. 0.0001
- D. 2.4360

- CLO1 18. If a discrete random variable has a probability distribution $P(X = x)$ with $X = 1, 2, 3$ and corresponding probabilities $P(1) = 0.2$, $P(2) = 0.5$, $P(3) = 0.3$. Calculate the mean of the distribution.
- Jika pembolehubah rawak diskret mempunyai taburan kebarangkalian $P(X = x)$ dengan nilai $X = 1, 2, 3$ dan kebarangkalian sepadan bagi $P(1) = 0.2$, $P(2) = 0.5$, $P(3) = 0.3$. Kirakan min bagi taburan ini.*
- A. 0.18
B. 1
C. 2.1
D. 7
- CLO1 19. A customer service center receives an average of 4 calls per minute ($\lambda = 4$). Compute the probability that the center receives exactly 2 calls in a given minute using Poisson formula.
- Pusat khidmat pelanggan menerima purata 4 panggilan seminit ($\lambda = 4$). Kirakan kebarangkalian mereka menerima tepat 2 panggilan dalam minit tertentu menggunakan formula Poisson.*
- A. 0.1464
B. 0.2928
C. 0.6795
D. 21.744
- CLO1 20. In a binomial distribution, the probability of success is $p = 0.6$ and the probability of failure is $q = 0.4$. If the number of trials is $n = 5$, compute the probability of getting exactly 3 successes.
- Dalam taburan binomial, kebarangkalian kejayaan ialah $p = 0.6$ dan kebarangkalian kegagalan ialah $q = 0.4$. Jika bilangan percubaan ialah $n = 5$, kira kebarangkalian mendapat 3 kejayaan.*
- A. 0.3
B. 0.3456
C. 0.576
D. 0.5

CLO1

21. Choose the non-sampling errors.

Pilih ralat bukan persampelan.

- A. Sampling bias / *Pensampelan berat sebelah*
- B. Incorrect data entry / *Kemasukan data yang salah*
- C. Selecting too small a sample / *Memilih sampel yang terlalu kecil*
- D. Choosing participants randomly / *Memilih peserta secara rawak*

CLO1

22. Identify the difference between random and non-random sampling.

Kenal pasti perbezaan antara persampelan rawak dan bukan rawak

- A. Random sampling is always better than non-random sampling
Persampelan rawak adalah lebih baik daripada persampelan bukan rawak
- B. Non-random sampling requires statistical software
Pensampelan bukan rawak memerlukan perisian statistik
- C. Random sampling selects participants systematically, while non-random sampling is always biased
Persampelan rawak memilih peserta secara sistematik, manakala persampelan bukan rawak sentiasa berat sebelah
- D. Random sampling gives each population member an equal chance of selection, while non-random sampling does not
Persampelan rawak memberikan setiap ahli populasi peluang pemilihan yang sama, manakala persampelan bukan rawak tidak

CLO1

23. Select the **TRUE** statement about the Central Limit Theorem.

*Pilih pernyataan yang **BENAR** tentang Teorem Had Pusat.*

- A. Mean of any sample will be equal to the population mean
Min mana-mana sampel akan sama dengan min populasi
- B. It only applies to small samples
Ia hanya terpakai kepada sampel kecil
- C. The mean sampling distribution approaches normality as sample size grows.
Purata taburan persampelan menghampiri normal apabila saiz sampel bertambah
- D. It does not apply to non-random samples
Ia tidak terpakai kepada sampel bukan rawak

CLO1

24. Define a 95% confidence interval.

Tentukan selang keyakinan 95%.

- A. There is a 95% chance that the sample mean is correct
Terdapat 95% kemungkinan bahawa min sampel adalah betul
- B. The true population parameter falls within the interval 95% of the time
Parameter populasi berada 95% daripada masa yang diperuntukan
- C. The margin of error is always 5%
Margin ralat sentiasa pada 5%
- D. The sample was randomly selected 95 times
Sampel dipilih secara rawak sebanyak 95 kali

CLO1

25. Identify the conditions that must be met to use the t-distribution instead of the z-distribution.

Kenal pasti syarat yang mesti dipenuhi untuk menggunakan taburan-t berbanding taburan-Z.

- A. The sample size must be greater than 30
Saiz sampel mestilah lebih besar daripada 30
- B. The population must be perfectly normal
Populasi mestilah normal
- C. The data must be biased
Data mesti berat sebelah
- D. The population standard deviation must be unknown
Sisihan piawai populasi mestilah tidak diketahui

CLO1

26. When determining the degrees of freedom for a small sample ($n < 30$), select the **CORRECT** formula to be used.

*Apabila menentukan darjah kebebasan untuk sampel kecil ($n < 30$), pilih formula yang **BETUL** untuk digunakan.*

- A. $df = n$
- B. $df = n - 1$
- C. $df = n + 1$
- D. $df = 2n - 1$

CLO1

27. A study found that 65% of sampled students prefer online learning. If the sample size is 200, compute the point estimate for the proportion of students who prefer online learning.

Kajian mendapati bahawa 65% pelajar lebih suka mengikuti pembelajaran dalam talian. Jika saiz sampel ialah 200, kirakan anggaran mata bagi perkadaran pelajar yang lebih suka pembelajaran dalam talian.

- A. 0.65
- B. 0.35
- C. 0.20
- D. 200

CLO1

28. A company surveyed 500 customers and found that 60% were satisfied with their service. Calculate the point estimate of the population proportion.

Sebuah syarikat meninjau 500 pelanggan dan mendapati 60% daripada pelanggan mereka berpuas hati dengan perkhidmatan mereka. Kirakan anggaran titik perkadaran penduduk.

- A. 0.06
- B. 0.40
- C. 0.60
- D. 0.50

CLO1

29. A researcher wants to determine a 95% confidence interval for the mean height of students in a university. Given a sample mean of 168 cm, standard deviation of 10 cm, and sample size of 100, calculate the confidence interval.

Seorang penyelidik ingin menentukan selang keyakinan 95% untuk purata ketinggian pelajar di universiti. Diberi min sampel 168 cm, sisihan piawai 10 cm, dan saiz sampel 100, hitung selang keyakinan.

- A. $168 \pm 1.96 \times \frac{10}{100}$
- B. $168 \pm 1.96 \times \frac{10}{\sqrt{100}}$
- C. $168 \pm 1.95 \times \frac{10}{100}$
- D. $168 \pm 1.95 \times \frac{10}{\sqrt{100}}$

CLO1

30. A company wants to determine the maximum error (ME) for a 95% confidence interval for estimating the average time customers wait in line. If the standard deviation is 4 minutes and the sample size is 64, calculate the margin of error.

Sebuah syarikat ingin menentukan ralat maksimum (ME) untuk selang keyakinan 95% bagi menganggarkan purata masa pelanggan menunggu dalam barisan. Jika sisihan piawai ialah 4 minit dan saiz sampel ialah 64, kirakan ralat margin.

- A. 0.98 minutes / 0.98 minit
- B. 1.96 minutes / 1.96 minit
- C. 2 minutes / 2 minit
- D. 4 minutes / 4 minit

SECTION B: 55 MARKS**BAHAGIAN B: 55 MARKAH****INSTRUCTION:**

This section consists of **TWO (2)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi DUA (2) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1

CLO1

SOALAN 1

- (a) (i) Describe the types of random variables.

Huraikan jenis pemboleh ubah rawak.

[4 marks]

[4 markah]

- (ii) Describe the binomial probability distribution term.

Huraikan istilah taburan kebarangkalian binomial.

[3 marks]

[3 markah]

- (iii) State **TWO (2)** examples of discrete variables and continuous variables.

Nyatakan DUA (2) contoh pemboleh ubah diskret dan pemboleh ubah berterusan.

[4 marks]

[4 markah]

- (iv) Explain the differences between Z and X values in normal distribution.

Terangkan perbezaan antara nilai Z dan X dalam taburan normal.

[4 marks]

[4 markah]

- (v) Give **ONE (1)** example of binomial distribution and Poisson distribution.

Nyatakan SATU (1) contoh kebarangkalian Binomial dan kebarangkalian Poisson.

[2 marks]

[2 markah]

CLO1

- (b) Question b (i) – b(ii) are based on the scenario below.
Soalan b (i) – b(ii) adalah berdasarkan senario di bawah.

Students test scores from DIT3 follow a normal distribution with a mean of 70 and a standard deviation of 10.

Markah ujian pelajar daripada DIT3 mengikut taburan normal dengan min 70 dan sisihan piawai 10.

- (i) Based on the statement above, calculate Z value if a student's test score (X) is 85.

Berdasarkan pernyataan di atas, hitung nilai Z jika markah ujian pelajar (X) ialah 85.

[4 marks]

[4 markah]

- (ii) Calculate the test score (X) if a student has Z value of -1.5.

Kira markah ujian (X) jika pelajar mempunyai nilai Z -1.5

[4 marks]

[4 markah]

Question b (iii) – b (v) are based on the scenario below.

Soalan b (iii) – b(v) adalah berdasarkan senario di bawah.

A dice is rolled, and the random variable X in Table B1 represents the score shown on the dice. The probability of each outcome is equal, as the dice is fair. Hence, you are required to:

Sebuah dadu dilontar dan pemboleh ubah rawak X dalam Jadual B1 di bawah mewakili skor yang ditunjukkan pada dadu. Kebarangkalian setiap keputusan adalah sama, kerana dadu adalah berbentuk sama. Anda perlu:

Table B1(b) / *Jadual B1(b)*

X (Dice score)	1	2	3	4	5	6
$P(X)$	1/6	1/6	1/6	1/6	1/6	1/6

(iii) Calculate mean

Kira min

[3.5 marks]

[3.5 markah]

(iv) Calculate variance

Kira varians

[6.5 marks]

[6.5 markah]

(v) Calculate standard deviation

Kira sisihan piawai

[1 mark]

[1 markah]

QUESTION 2

SOALAN 2

Question a (i) – a (v) are based on scenario below.

Soalan a (i) – a (v) adalah berdasarkan senario di bawah.

CLO1

- (a) Table B2 shown a random sample of 7 students was taken to estimate the average time (in hours) they study per day. The recorded times are:

Jadual B2 menunjukkan sampel rawak 7 orang pelajar telah diambil untuk menganggarkan purata masa (dalam jam) mereka belajar sehari. Masa yang direkodkan ialah:

Table B2/ Jadual B2

Average Time (In Hours) Study Per Day						
2.5	3	3.2	2.8	3.5	2.9	3.1

Assuming the study times are normally distributed and the population standard deviation is unknown, calculate a 95% confidence interval for the population mean study time.

Dengan mengandaikan masa kajian adalah taburan normal dan sisihan piawai populasi tidak diketahui, hitung selang keyakinan 95% untuk purata masa kajian populasi.

- (i) Sample mean ($\bar{x}$)

Min sampel ($\bar{x}$)

[2 marks]

[2 markah]

- (ii) Sample standard deviation (S)

Sampel sisihan piawai (S)

[9 marks]

[9 markah]

- (iii) Degrees of freedom (df)
Darjah kebebasan (df)

[1 mark]
[1 markah]

- (iv) Critical t value
Nilai t kritikal

[2 marks]
[2 markah]

- (v) Confidence interval
Selang keyakinan

[5 marks]
[5 markah]

END OF QUESTIONS

SOALAN TAMAT

FORMULA

Mean of a discrete random variable

$$E(X) = \mu = \sum_x x \cdot P(X = x)$$

Standard Deviation for discrete random variable

$$\sigma = \sqrt{\text{Var}(x)}$$

Where

$$\text{Var}(X) = \sum (x - \mu)^2 \cdot P(x)$$

Factorial

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

Z – Value (Z Score)

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

X – Value

$$X = Z \cdot \sigma + \mu$$

Binomial Distribution

$$P(X) = {}^n C_x P^x (Q)^{n-x}$$

Or

$$P(X) = {}^n C_x P^x (1-p)^{n-x}$$

Or

$$P(x) = \binom{n}{x} \cdot p^x \cdot q^{n-x}$$

Poisson Distribution

$$P(X) = \frac{\lambda^x e^{-\lambda}}{x!}$$

Sample Mean, $\bar{x}$

$$\bar{x} = \frac{\sum x_i}{n}$$

Sample Standard Deviation, S

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

Degree of Freedom

$$df = n - 1$$

where, $n = \text{size sample}$

Confidence Interval

$$\bar{x} \pm ME$$

where,

$$ME = t_{\alpha/2} \times \frac{s}{\sqrt{n}}$$

Standard Error of Mean, (*SEM*)

$$SEM = \frac{\sigma}{\sqrt{n}}$$

Critical t – value,

$t_{\alpha/2}$

t Table												
cum. prob one-tail	t ₅₀	t ₇₅	t ₉₀	t ₉₅	t ₉₈	t ₉₉	t ₉₇₅	t ₉₉	t ₉₉₅	t ₉₉₉	t ₉₉₉₅	
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
df												
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62	
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599	
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924	
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610	
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869	
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959	
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408	
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041	
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781	
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587	
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437	
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318	
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221	
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140	
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073	
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015	
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965	
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922	
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883	
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850	
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819	
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792	
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768	
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745	
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725	
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707	
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690	
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674	
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659	
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646	
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551	
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460	
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416	
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390	
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300	
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291	
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%	
	Confidence Level											

Z-Table

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0006	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

[illegible]

SULIT



**KEMENTERIAN PENDIDIKAN TINGGI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI**

**BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN TINGGI**

JABATAN TEKNOLOGI MAKLUMAT & KOMUNIKASI

PEPERIKSAAN AKHIR

SESI II : 2024/2025

DFC30323: STATISTICS AND PROBABILITY

PERATURAN PERMARKAHAN

**PENYELARAS
POLITEKNIK MERSING JOHOR**

SULIT

SECTION A

Commented [1]: 'Delete' muka surat ini.

SECTION A		
OBJECTIVE QUESTIONS		
<u>Answer</u>		
1. A	11. D	21. B
2. C	12. A	22. D
3. A	13. B	23. C
4. B	14. C	24. B
5. C	15. D	25. D
6. A	16. D	26. B
7. C	17. A	27. A
8. B	18. C	28. C
9. D	19. A	29. B
10. B	20. B	30. A
SECTION B		
QUESTION 1 (a)		
i. Describe the types of random variables. [CLO1 / C1]		
<u>Answer</u>		
● Discrete variables:		
A random variable that can take only a finite or countably infinite number of distinct values.		
● Continuous variables:		
A random variable takes an infinite number of values within a given range. These values are not countable and can take any value in an interval.		
Any relevant answers accepted		

Commented [2]:

MARK/NOTES

1.5 mark each

Total 4 marks

1

1

1

1

Any relevant
answers accepted

Commented [3]: Mohon tulis 'Any relevant answers accepted' di sebelah kiri 'column'.

ii. Describe the Binomial probability distribution term

Answer

Binomial probability distribution is a probability of a fixed number of successes in a fixed number of independent trials with two possible outcomes (success or failure).

Total 3 marks.

3

Any relevant
answers accepted

Commented [4]: Mohon tulis 'Any relevant answers accepted' di sebelah kiri 'column'.

iii. State **TWO (2)** examples of discrete variables and continuous variables.

Answer

Discrete Variables	Continuous Variables
Number of students in class	Time taken for software installation
Number of grade score in test	Temperature in city at specific time

Total 4 marks.

2

2

Any relevant
answers accepted

Commented [5]: Mohon tulis 'Any relevant answers accepted' di sebelah kiri 'column'.

iv. Explain the differences between Z and X values in Normal Distribution.

Answer

Z value	X value
Used to calculate probabilities or percentiles in a standard normal distribution (e.g., finding the probability that a score is above or below a certain value).	Represent the real-world data we interpret in the context of the given distribution

Total 4 marks

2 marks each

Any relevant
answers accepted

Commented [6]: Mohon tulis 'Any relevant answers accepted' di sebelah kiri 'column'.

v. Give **ONE (1)** example of Binomial distribution and Poison distribution.

Answer

Binomial	Poisson
Flipping a coin 10 times and counting the number of heads.	Counting the number of customer arrivals at a store in an hour.

Total 2 marks

1 mark each

Any relevant
answers accepted

Commented [7]: Mohon tulis 'Any relevant answers accepted' di sebelah kiri 'column'.

QUESTION 1 (b)

i. Based on the statement above, calculate Z value if a student's test score (X) is 85.

Answer

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

$$= \frac{85 - 70}{10}$$

$$= 1.5$$

Total 4 marks

1

2

1

Total 4 marks

ii. Calculate the test score (X) if a student has Z value of -1.5.

Answer

$$X = Z \cdot \sigma + \mu$$

$$= (-1.5) \cdot 10 + 70$$

$$= 55$$

1

2

1

Question b (iii) – b(v) are based on scenario Table B1(b.iii).

iii. Calculate Mean

Answer

$$\text{Mean, } \mu = 1\left(\frac{1}{6}\right) + 2\left(\frac{1}{6}\right) + 3\left(\frac{1}{6}\right) + 4\left(\frac{1}{6}\right) + 5\left(\frac{1}{6}\right) + 6\left(\frac{1}{6}\right)$$

$$= 3.5$$

Total 3.5 marks

0.5 mark each = 3m

0.5

Total 6.5 marks

iv. Calculate Variance

Answer

$$\text{Var} = \left[(1 - 3.5^2) \left(\frac{1}{6} \right) \right] + \left[(2 - 3.5^2) \left(\frac{1}{6} \right) \right] + \left[(3 - 3.5^2) \left(\frac{1}{6} \right) \right]$$

$$+ \left[(4 - 3.5^2) \left(\frac{1}{6} \right) \right] + \left[(5 - 3.5^2) \left(\frac{1}{6} \right) \right] + \left[(6 - 3.5^2) \left(\frac{1}{6} \right) \right]$$

$$= 1.0417 + 0.375 + 0.0417 + 0.0417 + 0.375 + 1.0417$$

$$= 2.9168$$

1 mark each = 6m

0.5

v. Calculate Standard Deviation	Total 1 mark																								
Answer																									
Standard Deviation, $\sigma = \sqrt{Var}$																									
$\sigma = \sqrt{2.9168}$	0.5																								
$= 1.7078$	0.5																								
QUESTION 2 (a)																									
Question a (i) – a (v) are based on scenario given.																									
i. Sample Mean ($\bar{x}$). [CLO1 / C2]	Total 2 marks																								
Answer																									
$\bar{X} = \frac{2.5 + 3 + 3.2 + 2.8 + 3.5 + 2.9 + 3.1}{7}$	1																								
$= \frac{21}{7}$	0.5																								
$= 3.0$	0.5																								
ii. Sample Standard Deviation (S). [CLO1 / C2]	Total 9 marks																								
Answer																									
<table><tr><th>x_i</th><th>$x_i - \bar{x}$</th><th>$(x_i - \bar{x})^2$</th></tr><tr><td>2.5</td><td>-0.5</td><td>0.25</td></tr><tr><td>3.0</td><td>0.0</td><td>0.00</td></tr><tr><td>3.2</td><td>0.2</td><td>0.04</td></tr><tr><td>2.8</td><td>-0.2</td><td>0.04</td></tr><tr><td>3.5</td><td>0.5</td><td>0.25</td></tr><tr><td>2.9</td><td>-0.1</td><td>0.01</td></tr><tr><td>3.1</td><td>0.1</td><td>0.01</td></tr></table>	x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	2.5	-0.5	0.25	3.0	0.0	0.00	3.2	0.2	0.04	2.8	-0.2	0.04	3.5	0.5	0.25	2.9	-0.1	0.01	3.1	0.1	0.01	1 mark each correct row
x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$																							
2.5	-0.5	0.25																							
3.0	0.0	0.00																							
3.2	0.2	0.04																							
2.8	-0.2	0.04																							
3.5	0.5	0.25																							
2.9	-0.1	0.01																							
3.1	0.1	0.01																							
$s = \sqrt{\frac{0.60}{7.1}}$																									
$= \sqrt{0.10}$																									
$= 0.316$	1																								
iii. Degrees of freedom (df). [CLO1 / C2]	0.5																								
	0.5																								

Answer $df = n - 1$ $= 7 - 1$ $= 6$	Total 1 mark 0.5 0.5
iv. Critical t- value. [CLO1 / C3] Answer For a 95% confidence level and $df = 6$ t- value from t-table is: - $t_{0.025,6} = 2.447$	Total 2 mark 1 1
v. Confidence Interval. [CLO1 / C3] Answer a. calculates margin of error (ME) $ME = 2.447 \times \frac{0.316}{\sqrt{7}}$ $= 2.447 \times \frac{0.316}{2.645}$ $= 2.447 \times 0.119$ $= 0.292$ So, confidence interval: $\bar{x} \pm ME$ $(3.0 - 0.292, 3.0 + 0.292)$ $(2.708, 3.292)$	Total 5 marks 1 0.5 0.5 0.5 0.5 0.5 1 1