MAJLIS PEPERIKSAAN MALAYSIA
Malaysian Examinations Council

PELANGI

LAPORAN PEPERIKSAAN STPM 2024

Mathematics (M) (950)

Mathematics (M) 950/1

OVERALL PERFORMANCE

The number of candidates for this subject was 489. The percentage of candidates who obtained a full pass was 31.70%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	6.19	2.06	2.27	2.68	5.98	5.98	6.54	7.09	5.15	3.30	52.76

RESPONSES OF CANDIDATES

PAPER 950/1 (ESSAY)

General comments

The overall quality of answers was below average, with many candidates demonstrating unsatisfactory performance. Notably, the majority of candidates performed well only in Question 3 (Matrix). In contrast, most candidates were unable to provide correct responses for Question 1 (Sketching of Graph), Question 2 (Series), Question 4 (Definition of Derivative), Question 5 (Integration), and Question 6 (Differential Equation).

It is important to highlight that a significant number of candidates disregarded key instructional terms such as "Hence," "Deduce," and "Use the previous result," which likely contributed to the poor performance in several questions.

Comments on individual questions

Question 1

Most candidates did not follow the question requirements, as they solved the inequality algebraically instead of using the required graphical method.

Answer: $\left\{x \mid 0 < x < \frac{1}{2}\right\}$

Question 2

Candidates were unable to apply the telescoping series technique to solve the problem. Those who managed to complete the first part of the question were generally unsuccessful in the second part, where they were required to find the infinite sum. A majority of candidates incorrectly used the $S_{\infty} = \frac{a}{1 - r}$ formula, which is only applicable to geometric series.

Answer: $\frac{1}{3}$

Question 3

Most candidates were able to solve part (*a*) of the question. However, for part (*b*), those who were unsuccessful had used elementary row operations to find the inverse, instead of deducing the inverse matrix from the equation provided in the question.

Answer: (*a*) $t = -4$, $v = 5$

(*b*) $M^{-1} = \begin{pmatrix} \frac{1}{5} & \frac{2}{5} & \frac{2}{5} \\ \frac{2}{5} & \frac{1}{5} & \frac{2}{5} \\ \frac{2}{5} & \frac{2}{5} & \frac{1}{5} \end{pmatrix}$

Question 4

Most candidates did not score any marks for this question due to their weak understanding of the concept of the definition of a derivative, which requires the using of definition to find the derivative. Consequently, they failed to answer part (*a*). Only a few candidates answered part (*b*) correctly, while most solved the equation by expressing q in terms of m and x instead of comparing the coefficients as required. For part (*c*), candidates did not follow the instructions and instead used the left-hand and right-hand limits to find the value of m.

Answer: (*a*) $\lim_{x \to 2}(x^2 + 2x + 2) = 10$

(*b*) $q = -m - 2$

(*c*) $m = 6$

Question 5

Most candidates were unable to answer this question as they appeared to have overlooked the constant *c*. Another common error observed was the use of differentiation, specifically the quotient rule, instead of the appropriate integration method to solve the question.

Answer: $= \frac{1}{6}(2x + 1)^{\frac{3}{2}} - \frac{1}{2}(2x + 1)^{\frac{1}{2}} + c$

Question 6

Most candidates were able to determine the integrating factor correctly. However, many once again overlooked the inclusion of the constant *C*. Another common error observed was the use of an incorrect integrating factor such as $e^{-\ln x} = -x$ or $e^{\ln x} = x$.

Answer: $y = \frac{3}{2}x^3 + cx$

Question 7

Almost all candidates attempted this question and were able to answer parts (*a*), (*b*), (*d*), and (*e*) correctly. However, for part (*c*), many candidates used a graphical method to prove that the function is one-to-one, which was incorrect. Other common errors included incorrect usage of $\mathrm{gf}(x) = \sqrt{x^2 - 16} = x - 4$ and $(x - 16)^2 = x^2 - 256$.

Answer: (*a*) $(x \in \mathbb{R} \mid x < -4\} \cup \{x \in \mathbb{R} \mid x \geqslant 4\}$

(*b*) $x = \frac{17}{2}$

(*c*) Not one-to-one

(*d*) $a = 9$

(*c*) Range = $[6, \infty)$, Domain = $(-\infty, \infty)$

Question 8

Almost none of the candidates attempted this question. Among those who did, performance was poor, as they were unable to progress to the graph-sketching part due to a lack of familiarity with equations of the form y^2.

Answer: (*a*) $x = 0, -\frac{4}{5}$

(*b*) $\frac{32}{105}$

Mathematics (M) 950/2

OVERALL PERFORMANCE

The number of candidates for this subject was 460. The percentage of candidates who obtained a full pass was 71.74%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	8.33	10.53	8.55	12.06	12.50	8.99	10.78	5.16	5.26	1.97	15.87

RESPONSES OF CANDIDATES

PAPER 950/2 (ESSAY)

General comments

The performance of the candidates reflected a wide range of mathematical ability among STPM candidates. The responses from high-performing candidates demonstrated a strong understanding of mathematical concepts, with answers that were nearly perfect. These candidates exhibited systematic problem analysis and effective planning in their solutions.

Poor-performing candidates were generally not careful in reading and understanding the questions, which resulted in their inability to obtain full marks for their answers.

Comments on individual questions

Question 1

The overall performance of the candidates was moderate. Most candidates were able to show that the frequency density $k = 3.75$ and correctly obtained the total frequency in part (*a*). In part (*b*), the histogram was plotted accurately by most candidates. However, a number of candidates were unable to accurately describe the skewness of the distribution based on the histogram. Some also failed to notice that the last class interval length differed from the others. In part (*c*), several candidates did not calculate the percentage correctly.

Answers: (*a*) 200

(*b*) Positively skewed, 3

(*c*) 16.5%

Question 2

Only a few candidates were able to answer both parts (*a*) and (*b*) of this question. Some candidates managed to answer part (*a*) but not part (*b*), while others left the question unattempted.

Answers: (*a*) 60

(*b*) 120

Question 3

Many candidates were unable to properly define the required random variable and the corresponding binomial distribution to find the probability in part (*a*). In part (*b*), nearly all candidates failed to accurately list the assumptions associated with the binomial distribution.

Answers: 0.00672

Question 4

Many candidates were unable to accurately comment on why the Pearson correlation coefficient was not suitable to describe the relationship in the given data in part (*a*). In part (*b*), most candidates were able to correctly apply the Spearman rank correlation coefficient formula and interpret the results. For part (*c*), many candidates were able to answer part (*c*)(i) but not part (*c*)(ii). Those who answered part (*c*)(i) often made separate calculations using the corrected data.

Answers: 0.2848

Question 5

The majority of candidates were able to determine m using the correct formula in part (*a*). Most candidates also accurately calculated the Laspeyres and Paasche indices in part (*b*). However, many candidates were unable to provide an accurate comparison and commentary on the indices in part (*c*). Instead, they merely interpreted the two indices without making a meaningful comparison between them.

Answers: (*a*) RM7.30

(*b*) (i) 109.63
(ii) 107.32

Question 6

Most candidates were able to determine the value of x based on the concept of seasonal indices in part (*a*). Many candidates also successfully calculated the forecast values in part (*b*) and provided appropriate comments based on the comparisons in part (*c*).

Answers: (*a*) 1.65

(*b*) Monday, week 4 = RM22 835.00
Sunday, week 4 = RM79 216.50

Question 7

Few candidates chose to answer this question. Among those who attempted it, the majority of the candidates were able to determine the required value and correctly construct the contingency table for part (*a*). However, most candidates were unable to answer parts (*b*) and (*c*) correctly.

Answers: (*a*) 0.00398

(*b*) (i) 0.580
(ii) 0.0159

Question 8

Most candidates chose to attempt this question in Section B. They were generally able to plot the scatter diagrams satisfactorily for part (*a*), though many could not accurately describe the relationships observed. In parts (*b*) and (*c*), most candidates successfully performed the required calculations. However, in part (*b*)(ii), many did not compare the correlation coefficient values and instead commented on the individual values separately, failing to elaborate on the implications of the comparison between the two correlation coefficients. In part (*d*), most candidates obtained the predicted values but were unable to comment on the reliability of these values.

Answers: (*a*) (i) 0.3871

(c) $y = 0.2203x + 55.023$

(d) $y_1 = 64.9$; $y_2 = 64.5$

Mathematics (M) 950/3

OVERALL PERFORMANCE

The number of candidates for this subject was 459. The percentage of candidates who obtained a full pass was 79.74%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	9.37	4.36	10.68	7.63	12.20	20.48	15.02	1.96	4.36	0.87	13.07

RESPONSES OF CANDIDATES

General comments

The answers presented by good candidates demonstrated a comprehensive understanding of mathematical concepts, with solutions that were nearly perfect. These candidates showed systematic problem analysis and effective planning in their answers. Their strength lay in recognising familiar question types and performing the appropriate calculations to obtain the correct answers.

However, candidates began to show weaknesses and make errors when faced with less familiar questions. For example, in Q1, which required a deeper understanding of mathematical concepts and the underlying principles, many struggled to provide accurate solutions.

Comments on individual questions

Question 1

Most candidates performed poorly on this question. Some candidates were unfamiliar with the calculation of the future value with unequal payments. In general, candidates calculated the future value of RM2960 deposited for the first m years only, without realising that the amount was not the accrued value at the end of $4m$ years. Some candidates were able to calculate the accrued amount of RM5920 for the subsequent $3m$ years but failed to calculate the future value of the RM2960 deposits for the initial m years. Additionally, several candidates disregarded the provided information $(1 + i)^m = 1.2$, insisting instead on calculating the value of m to be used in their answers.

Answers: (*a*) 0.0952 or 9.52%

(*b*) $X = 17447.56$

Question 2

The performance of the candidates was moderate. In part (*a*), most candidates correctly determined the demand function, but some provided incorrect supply functions. They appeared to misunderstand that the "cost of a book" refers to its price, and when the book is given for free, the price should be considered zero. However, candidates were generally able to equate the demand and supply functions to obtain the equilibrium price and quantity of the books.

Answers: (*a*) Supply: $q = 2p + 5$, Demand: $q = 32 - 4p$

(*b*) p = RM4.50 and $q = 14$

Question 3

The question was generally well answered. Most candidates were able to plot the given constraints correctly but failed to identify the correct feasible region due to errors in plotting the region for $x - y \leqslant 2$. Some candidates lose marks for not drawing the objective function line, failing to label the constraints, or incorrectly shading the feasible region. Among the candidates who plotted the objective function line, several encountered difficulties in determining the optimal solution, as they were unfamiliar with handling an objective function line with a negative gradient.

Answers: 6

Question 4

This was a straightforward and familiar question, and the overall performance of the candidates was quite good. However, some candidates encountered difficulties in calculating holding costs. A number of candidates mistakenly used monthly demand as annual demand, which affected their calculations at every step and ultimately led to incorrect answers in parts (*a*) and (*b*). Additionally, some candidates were unable to write the correct formula for the total annual inventory cost with planned shortage in part (*b*).

Answers: (*a*) (i) 26.8
(ii) 35.5

(*b*) TC = RM1610; TCS = RM1217.02; allow backorder

(*c*) $y_1 = 64.9$; $y_2 = 64.5$

Question 5

The performance of the candidates was quite good. Most candidates were able to correctly draw an AOA network with a dummy in part (*a*). However, only few candidates were able to justify the necessity of the dummy in part (*b*). Additionally, some weak candidates confused AOA with AON and mistakenly drew an AON network instead.

Question 6

The performance of the candidates was moderate. When applying the graphical method to obtain the solution, some candidates incorrectly drew the line $E(p) = 1$, resulting in an incorrect solution. Among those who plotted the graph correctly, many incorrectly stated the optimal solution as a single point rather than a range. Most candidates determined the optimal strategy for Player A without using the envelope graph, instead randomly equating any two out of the three equations formed from the payoff matrices, which led to incorrect optimal strategies and expected gains.

Answers: (*a*) $\frac{3}{8} \leqslant p \leqslant \frac{7}{11}$

(*b*) 1

Question 7

Candidates who chose to answer this question performed moderately. Most were able to construct the profit function correctly and subsequently determined the minimum student enrolment required to avoid a loss for the college, as well as the number of enrolments that yield the maximum profit, by correctly applying the first derivative to the profit function. Unfortunately, some candidates lost marks due to errors made in formulating the profit function, which affected all subsequent calculations. Many candidates failed to find the correct approximate change in profit using the marginal profit by substituting $x = 20$. Additionally, candidates struggled to sketch an accurate graph of the profit function within the given range and failed to provide the correct interval for the production level at which profit is increasing.

Answers: (*a*) $-17x^2 + 1200x - 10000$

(*b*) $x = 10$

(*c*) 520

(*d*) $x = 35$

Question 8

Most candidates attempted Question 8. Although part (*a*) specifically required calculating the earliest and latest times as well as the total float for each activity based on the given AON diagram, many candidates unnecessarily redrew the AON diagram with the earliest and latest times stated. Marks were lost for AON diagrams that were presented without a key. In part (*b*), most candidates obtained the correct answers. However, in part (*c*), many candidates drew the Gantt chart without indicating the number of workers required for each week. Consequently, in part (*d*), candidates lose marks when determining the least number of workers required, as they provided no explanation or illustration on the Gantt chart to show how the answer was derived.

Answers: (*b*) $P - R - T - U$; 20 weeks

(*d*) 6 workers; 4 workers

LAPORAN PEPERIKSAAN STPM 2024

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