MAJLIS PEPERIKSAAN MALAYSIA
Malaysian Examinations Council

PELANGI

Laporan Peperiksaan STPM 2023

Matematics (M) (950)

Matematics (M) 950/1

OVERALL PERFORMANCE

The number of candidates for this subject was 541. The percentage of candidates who obtained a full pass was 33.46%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	7.21	2.40	2.77	2.59	4.62	6.10	7.76	3.88	4.07	4.07	54.53

RESPONSES OF CANDIDATES

PAPER 950/1 (ESSAY)

General comments

Overall, the quality of answers was below average. Many candidates did not perform well. Only a few above average candidates' answers were systematic, logic, well organized and well presented with the right concepts and steps.

The candidates' use of English was standard.

Comments on individual questions

Question 1

Most of the candidates were not able to write $x > 1$ and did not write the domain of $(f \circ g)$. Only the above average candidates can sketch the graph correctly. There are a few candidates lost marks because they did not write the x-intercept and asymptote in the graph.

Answer: (*a*) $\ln(x - 1)$ *for* $x > 1$, *Domain of* $(\mathrm{f} \circ \mathrm{g})$ is $(1, \infty)$.

Question 2

Most of the candidates were not able to relate geometric series with arithmetic series. This question can be easily solved if the candidates consider arithmetic from the beginning. Those candidates using ratio of geometric sequence to find the value of x, most of them got two values of x and they did not verify the correct value of x. Some candidates used wrong formula in finding the difference between the 10^{th} term of geometric series and the sum of up to the 10th term of the arithmetic series.

Answer: (*a*) $x = 3$ (*b*) 2285

Question 3

Most of the candidates were able to solve part (*a*) of the question. They were able to use Elementary Row Operation to verify the result. Common mistake done by the candidates are multiplying rows together, deleting rows and even adding constant to their rows. For part (*b*), candidates were able to write down the conditions for a unique solution, infinitely many solutions and no solution. Part (*c*) is related to part (*b*), so candidates not able to substitute $k = 0$ and solve the equations. So, they managed to solve until $z = t$ only.

Answer: (*b*) (i) $k \neq 0, k \neq 2$ (ii) $k = 0$ (iii) $k = 2$

(c) $x = t, y = 0, z = 1 - t$ where $t \in \mathbb{R}$

Question 4

Most of the candidates were able to find all the point lies on the curve. They could find $\frac{dy}{dx}$ by using product rule and equate it to zero to find the value of x where the point C is local minimum. They were also able to do same for $\frac{d^2y}{dx^2}$ to find a poit of inflexion.

Some candidate equates e^{-2x} to zero and get wrong value of x. They do not realize there is no solution for $e^{-2x} = 0$.

Answer: $A(0, 1), B\left(\frac{1}{2}, 0\right), C(1, -e^{-2}), D\left(\frac{3}{2}, -2e^{-3}\right)$

Question 5

Most of the candidates were not able to answer this question. They do not know how to use integration by parts and also do not know to integrate e^{-2x} with respect to x. Some of the candidate forgot to add a constant at the end of the integration process.

Answer: $\left(-\frac{1}{2}x + \frac{1}{4}\right)e^{-2x} + c$

Question 6

Most of the candidates were not able to integrate

$$\int \frac{1}{ax}\, dx = \frac{1}{a} \ln ax$$

Some of candidates forgot to write the constant C after performed indefinite integral. Many candidates obtain the integrating factor and solve the equation by using integrating factor. Some misinterpreted the question by using initial condition $t = 1$ instead of $t = 0$.

Answer: $x = 20e^{0.012t}$

Question 7

Almost all candidates chose to answer this question. Most of the candidates attempted to factorize $2x^3 + 3x^2 - 1$ using calculator. Many were not able to express f(x) in partial fraction correctly because of the term $(x + 1)^2$. Candidates have no problem to expand f(x) as a series of as in ascending powers of x since the formula are given.

Answer: $f(x) = \frac{1}{x+1} - \frac{2}{(x+1)^2} + \frac{3}{2x-1}$, $-4 - 3x - 17x^2 - \ldots$, $\left\{x : |x| < \frac{1}{2}\right\}$

Question 8

Almost none chose this question. For candidates who chose this question, they did it badly. Some candidates forgot to write the points of intersection after compute the values of x and y. Only few candidates able to reach part (b). Not many candidates manage to answer part (c). Almost none candidates can answer part (d).

Answer: (a) $(1, 4), \left(\frac{1}{4}, \frac{11}{2}\right)$

(b) $\frac{1}{6}$

(c) $\frac{3}{40}\pi$

OVERALL PERFORMANCE

The number of candidates for this subject was 522. The percentage of candidates who obtained a full pass was 68.77%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	9.20	4.98	9.77	11.49	10.54	10.54	12.26	6.98	3.88	5.23	15.13

RESPONSES OF CANDIDATES

PAPER 950/2 (ESSAY)

General comments

In general, the performance of candidates was satisfying. The candidates were good in answering in quantitative questions but weak in answering qualitative questions.

There is a significant difference in the quality of scripts produced by different centers. Some had been well prepared and showed considerable confidence in their responses. There were some excellent scripts with well-planned and clearly presented responses.

The candidates' proficiency in English was somewhat lacking, yet acceptable.

Comments on individual questions

Question 1

Overall performance of this question was good. Most students were able to calculate the Pearson's coefficient of skewness, as well as to determine the new mean, median, standard deviation and Pearson's coefficient of skewness after the removal of a data point. However, majority of the students were not able to interpret the effect of the wrongly recorded observation on the skewness of the data. Few of the candidate did not use the correct formula for the Pearson's coefficient of skewness.

Answers: (*a*) Pearson's coefficient of skewness = 0.387

(*b*) New mean = 45.16
New median = 45.0
New SD = 15.035
Pearson's coefficient of skewness = 0.032

(*c*) Affect the skewness of the data.

Question 2

The performance of the candidates was poor. Most were able to answer part (*a*) of the question. Students who were able to list out the correct possible outcomes of the experiment were able to answer part (*b*). For part (*c*), many candidates were not able to provide clear working to show the answer given in the question. For part (*d*), quite a number of students were not able to calculate the conditional probability using the correct formula.

Answers: (*a*) {3, 4, 5, 6, 7, 8, 9, 10}

(*b*) $P(\text{Score more than } 12) = 0.2$

(*c*) $P(\text{Score of } 6) = \frac{2}{15} = 0.1333$

(*d*) $P(\text{odd} \mid \text{score } 6) = \frac{1}{2} = 0.5$

Question 3

Candidates performed moderately. Many students were not able to form the correct inequality based on the question to begin solving this question. There were a number of students who interpreted the question as involving a one-sided inequality only. However, most students do not have difficulty in standardizing the random variable and reading the normal probability table.

Answers: 0.9544

Question 4

The performance was moderate. Most students were able to use the coefficient of determination formula to calculate correctly, but were not able to comment accurately. A number of the students interpreted the coefficient of determination based on strength of correlation instead of amount of variation explained. It appeared many could not relate to which is a better variable for prediction based on the value of coefficient of determination.

Answers: $r^2 = 0.99949$

99.9% of variation in the daily sales is explained by the size of restaurant

Size of restaurant because r^2 value is greater.

Question 5

Overall performance was moderate. Students were able to calculate the simple average of relative price index correctly, but many were not able to comment accurately on the answer.

Answers: (*a*) $I_{23/21} = 97.31$

The price in 2023 is 2.69% lower compared to 2021

(*b*) Cost in year 2023 = RM1.12 billion

Question 6

The performance was moderate. Most were able to comment on the trend observed from the time series and to suggest a suitable model, but could not justify their suggestion of suitable model for the time series in part (*a*). Majority of the candidates were able to make the calculations needed to obtain the equation of trend line in part (*b*). In part (*c*), many students were able to get the correct time $t = 27$ but did not multiply by 1.08 to forecast correctly.

Answers: (*a*) An increasing linear trend; multiplicative model

(*b*) $\hat{T} = 43.2838 + 7.7886t$

(*c*) 273.862 thousand

Question 7

Few students opted to attempt this question. Majority of those who attempted this question were able to calculate correctly for part (*a*) and part (*b*). Some students were not able to find the correct probability based on the concept of independence and hence, could not answer part (*c*) and part (*d*) accurately. For part (*d*), a number of students calculated the expected number of tomatoes instead of expected number of packs as required by the question.

Answers: (*a*) 0.02609

(*b*) 0.0746

(*c*) 0.02121

(*d*) 0.2121

Question 8

Most students chose to attempt this question for Section B. They could plot the scatter diagram satisfactorily for part (*a*). Generally, most students were able to solve correctly in terms of the calculations in part (*b*) and part (*d*). However, most were unable to give accurate comments and reasoning for part (*e*) and part (*f*). A number of students could not answer part (*c*) correctly as well.

Answers: (*b*) $r_s = 0.4424$

(c) Student C

(d) $r_p = 0.4242$

(e) Spearman rank may be more appropriate due to less effected.

(f) Writing and speaking; higher values from total score.

OVERALL PERFORMANCE

The number of candidates for this subject was 516. The percentage of candidates who obtained a full pass was 73.83%.

The achievement of candidates according to grades is as follows:

Grade	A	A–	B+	B	B–	C+	C	C–	D+	D	F
Percentage	13.57	11.43	4.84	6.40	14.53	11.82	11.24	4.26	1.36	3.88	16.67

RESPONSES OF CANDIDATES

General comments

The performance of the candidates showed a wide range of mathematical ability among STPM candidates. There was significant difference in the quality of scripts produced by different centres.

The answers presented by good candidates showed full understanding of Mathematical concept with nearly perfect working. They showed systematic analysis of the problems and good planning in their answers.

Comments on individual questions

Question 1

The performance of the candidates for this question was moderate. Most of the candidates can obtained two equations of the depreciation but failed to solve it correctly. They were not familiar on how to solve simultaneous equation which involve indices. Some of the candidates wrongly used formula (used flat rate depreciation method instead of reducing balance method). Some candidates confused the formula for depreciation and compounded interest.

Answers: $i = 0.35$

Question 2

The performance of the candidates was good. Most candidates were able to obtain correct revenue function that would bring to the profit function and the maximum profit. Some candidates lost mark because obtained maximum profit without testing.

Answers: 1000

Question 3

The question was quite well answered. Most mistakes made by the candidates were wrongly draw the constraint $2x = y$ as $2x > y$ or $2x < y$. Due to this mistake, the incorrect region was shaded. Some candidates lost mark because didn't draw and label objective function line to determine the optimal solution.

Answers: Minimum cost: RM 1400

Question 4

Most of the candidates did well for part (*a*) and part (*b*). For part (*c*), some candidates lost mark because they didn't draw total float. For part (*d*), quite a number of candidates fail to give explanation to obtain the least number of coaches required to complete the project in minimum time. Candidates were unable to express the reason in words.

Answers: (*a*) $r = 7$, $s = 1$

(*b*) *A–B–D–G–H–I*

Question 5

The performance of candidates was quite good. However, many candidates faced some problems in obtain holding cost. The wrong holding cost was affecting the answers for every step of the solution and finally they obtained wrong answer. Quite a number of candidates didn't check the cycle time before calculate reorder point. Besides that, some candidates lost mark because didn't include purchasing cost when calculate annual total cost.

Answers: (a) 22 units

(b) 8 units

(c) 11 orders

(d) RM479559.82

Question 6

The performance of the candidates was moderate. Many candidates could obtain the elimination method to reduce the pay-off matrix. When apply graphical method to obtained solution, some candidates miss out line $y = 4$ hence end out with wrong solution. For those plot graph correctly, mostly wrongly states optimal solution as a point instead of a range. However, candidates know method to determine value of game.

Answers: (a) $\begin{pmatrix} 6 & 4 & 3 & 5 \\ 2 & 4 & 8 & 3 \end{pmatrix}$

(b) $\frac{1}{2} \leqslant p \leqslant \frac{4}{5}$

(c) 4

Question 7

Very few of the candidates attempted this question. This question was not well presented by the candidates. Candidates performed badly and some shown no attempts. Almost all candidates failed to answer this question.

Answers: (a) $B_n = 0.9^n x$

(b) $\dfrac{x(i + 0.1)[(1 + j)^n - 0.9^n]}{j + 0.1}$

(c) 1776.74

Question 8

Many candidates could determine the objective function. Moderate candidates only recognize two out of three constraints of the linear programming. Besides that, some candidates did not state $x, y \geqslant 0$ as constraints which should be included in the model. Most of the candidates were able to construct first, second and third simplex tableau and state the optimum solution. Some of the candidates failed to obtain second or third tableau correctly because they choose wrong pivot row. Some of them made careless mistake when perform further iterations.

Answers: (*a*) Maximize $P = 100x_1 + 300x_2 + 200x_3$

subject to

$$80x_1 + 40x_2 + 60x_3 \leqslant 6400$$
$$x_1 + 2x_2 + x_3 \leqslant 160$$
$$x_1 + x_2 + x_3 \leqslant 100$$
$$x_1, x_2, x_3 \geqslant 0$$

(*b*) $A = 0$ acre, $B = 60$ acre, $C = 40$ acre

(*c*) RM26000

Laporan Peperiksaan

STPM 2023

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