Mathematics S (950)

OVERALL PERFORMANCE

The number of candidates for this subject was 1815. The percentage of candidates who obtained a full pass was 57.96%, a decrease of 4.15% compared with the previous year.

The achievement of candidates according to grades is as follows:

Grade	A	A−	B+	B	B−	C+	C	C−	D+	D	F
Percentage	2.48	3.69	6.89	9.81	10.52	10.96	13.61	4.52	5.01	5.02	27.49

RESPONSES OF CANDIDATES

PAPER 950/1 (MATHEMATICS S)

General comments

Generally, the majority of answers were well written. However, quite a number of answers were not well thought off and the logical sequence was not there.

Comments on individual questions

Question 1

Almost all candidates were familiar with the property $\log ab = \log a + \log b$, but most of them made mistakes as they thought that $\log x^2 = (\log x)^2$ and $\log x + \log y = 5 \Leftrightarrow x + y = 5$.

Answers: $x = 27$, $y = 9$

Question 2

Most candidates were able to find $\dfrac{du}{dx}$ and used the chain rule. However, only a few were able to simplify $\sqrt{u^2 - 1}$ or $\dfrac{du}{dx}$ in terms of x correctly, and express $u^2 - 1$ as a perfect square. Since the solution required clear proof, the steps involved should have been detailed, but many candidates just concluded with the answer.

Question 3

Some candidates were aware of the condition for a convergent series which was $|r| < 1$, but they failed to realise that $e^{-x} > 0$ for all real values of x and thus, they did not answer the first part correctly. As for the second part, more than half of candidates did not provide the exact value as required by the question.

Answers: $\{x : x > 0\}$, $x = \ln \dfrac{4}{3}$

Question 4

Most candidates were able to find $f'(x)$. However, the majority of candidates failed to observe that the next part requires them to use answer from the first part. These candidates did not use the anti-derivative concept to obtain the answer but used integration by parts instead.

Answers: $f'(x) = 1 + \ln x$, $2e \ln e$

Question 5

There were only a few candidates who were able to use the definition for $A - B$ to establish the proof for the first part.

Answer: $k = \dfrac{2}{3}$

Question 6

Candidates could find the domain and range but could not gave the answer in the correct set form, or vice versa. Majority of the candidates were also very weak in giving explanation and reasoning.

Answers: $D_f = [-3, -1) \cup (-1, 2]$, $R_f = (-1, 2)$

Question 7

Most candidates were able to answer the first part, but failed to solve the inequality $p(x) \leqslant 0$ in the second part. Most candidates just showed that $x^2 - 4x + 5 = 0$ had complex roots without realising that it was always positive. Some candidates just ignored the quadratic factor saying that it had complex roots.

Answers: $a = 9$, $b = -5$, $\{x : -1 \leqslant x \leqslant \dfrac{1}{2}\}$

Question 8

Most candidates were able to find the constants A, B, C and D. However, there were some who made careless mistakes in solving the equations. There were also instances where candidates did not use the "$\approx$" sign correctly and at the appropriate places.

Answers: $A = 1$, $B = -3$, $C = 4$, $D = 0$

Question 9

Most candidates were able to sketch the graph of $y = e^{-x}$, but they were not able to sketch the graph of $y = \dfrac{4}{2 - x}$. In many cases, candidates only drew part of the rational function which lay in the first and second quadrant. Most candidates were able to use the Newton-Raphson method correctly to estimate the root of the equation.

Question 10

Candidates did not performed well in this question. Some candidates were not aware of the properties of the circle. Very few candidates were able to answer the last part of the question since they did not realise that the two circles actually touched each other and hence, the intersection point was the midpoint of the two centres.

Answers: (*a*) $(x + 2)^2 + (y - 3)^2 = 25$; (*b*) $(-2, 3)$, 5; (*c*) (i) 10, (ii) (1, 7)

Question 11

Quite a number of candidates were able to find the composite function and stationary points correctly and to sketch the graph. However, some candidates failed to give the overall graph and presented only partial sketch or incomplete graph. For example, the sketch terminated in the second quadrant and did not proceed to the third quadrant. As for the second part, many candidates failed to sketch the graph $y = \dfrac{1}{h(x)}$ correctly. As a result, they were not able to give the right answers for part (*c*). Some candidates did not give the answers in the set form.

Answers: (*a*) $(x - 1)^3 - 3(x - 1) + 2$, $(0, 4)$, $(2, 0)$; (*c*) (i) $\left\{ k : k < \dfrac{1}{4}, k \neq 0 \right\}$, (ii) $\left\{ k : k = \dfrac{1}{4} \right\}$, (iii) $\left\{ k : k > \dfrac{1}{4} \right\}$

Question 12

All candidates knew that $\mathbf{P}^{-1} = \dfrac{1}{|\mathbf{P}|}$ Adj $\mathbf{P}$. However, quite a number of candidates confused with transpose of a matrix, adjoint and cofactors.

Some candidates were weak in transforming the information given into a system of linear equations. The candidates straight away wrote the matrix equation which they inadvertently missed showing the transformation of worded problems into mathematical equations clearly.

Answers: (*a*) $|\mathbf{P}| = 14$, Adj $\mathbf{P} = \begin{pmatrix} 2 & 1 & 5 \\ 8 & -3 & -1 \\ -4 & 5 & -3 \end{pmatrix}$, $\begin{pmatrix} \dfrac{1}{7} & \dfrac{1}{14} & \dfrac{5}{14} \\ \dfrac{4}{7} & -\dfrac{3}{14} & -\dfrac{1}{14} \\ -\dfrac{2}{7} & \dfrac{5}{14} & -\dfrac{3}{14} \end{pmatrix}$

(*b*) (ii) $x = 5$ minutes, $y = 8$ minutes, $z = 10$ minutes

PAPER 950/2 (MATHEMATICS S)

General Comments

In general, candidates' performance was not satisfactory although the questions were straight forward and easy. Answers were not well-planned and not presented step-by-step. Incorrect Mathematical notations were used by candidates, resulting in the loss of marks. Many candidates just gave the numerical answer without answering the questions in words.

Comments on individual questions

Question 1

The performance of candidates varied from center to center of examinations. At some centers, candidates got mixed up between P(D|F) and P($D \cap F$). They also confused mutually exclusive events with independent events.

Answers: (*a*) 0.33; (*b*) 0.2375

115

Question 2

The performance of candidates was very good. However, some gave the answers in terms of percentages.

Answers: (*a*) 107.14; (*b*) 134.78

Question 3

The performance of candidates was good, particularly in part (*a*), but many candidates were not able to find the modal value.

Answers: (*a*) 0.401; (*b*) $X = 0$

Question 4

The performance of candidates was very poor. Many candidates used X instead of $\bar{X}$ and they were unable to write the probability statement "within $\dfrac{3}{4}$ hours of the population mean".

Answers: (*a*) 0.866; (*b*) 0.397

Question 5

The performance of candidates was good, but most candidates were not able to define r and $r = 0$ precisely. However, many of them got the range for r correctly.

Answers: (*a*) (ii) $-1 \leqslant r \leqslant 1$; (*b*) (i) -0.709

Question 6

The performance of candidates was quite poor. They were not able to provide comments for the time series. Some candidates conducted an approximation too early, contributing to incorrect solutions in part (*b*).

Answers: (*b*) Period 1 = 0.397, Period 2 = 0.795, Period 3 = 1.81

Question 7

Many candidates were able to find the constraints for the linear programming problem. Quite a number of them were not able to formulate the model correctly.

Answers: (*c*) $x = 25$, $y = 20$, maximum profit = RM16 000

Question 8

The performance of candidates was moderate. Some candidates did not label the *x*-axis and made a mistake by using the mid-points of the classes. There were candidates who did not draw the box-plot on graph paper.

Answers: Median = 3.90 hundred thousand, Q_1 = 3.15 hundred thousand, Q_3 = 4.85 hundred thousand

Question 9

The performance of candidates was poor. Some candidates were not able to give the correct notation for sampling proportion, i.e. $\hat{p}$. They did not state that the sampling distribution was approximately normal.

Answers: (*a*) $\hat{p} \cdot N(0.8, 0.0016)$; (*b*) (i) 0.0668, (ii) 0.683

Question 10

The performance of candidates was not good. Many candidates were able to answer part (*a*), but they had problem with parts (*b*) and (*c*).

Answers: (*a*) 0.17; (*c*) 0.0199

Question 11

The performance of candidates was good. Many candidates scored high marks for this question. Correct sequence and arrows were clearly shown in candidates' network.

Answers: (*b*) A–C–G–I , 15 days

Question 12

This question was well answered by many candidates. Many candidates were able to draw the scatter diagram correctly, but some of them were not able to provide comments on the relationship between the two variables correctly. When finding the least square line, candidates did an approximation too early. Most candidates were not able to provide a comment that we could not extrapolate beyond the range of the given data.

Answers: (*b*) $Y = -0.421 + 0.804X$; (*d*) 5 calls