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MATHEMATICS (M) (950/1)

OVERALL PERFORMANCE

In Semester 1, 881 candidates sat for the examination of this subject and 35.31% of them obtained a full pass.

The percentage of each grade is as follows:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percentage	5.22	2.50	3.41	3.18	7.95	6.47	6.58	4.09	4.31	3.41	52.89

SEMESTER 1

CANDIDATES' RESPONSES

General comments

Overall, the quality of the answer was average. Some candidates performed very well and some performed badly. For the above average candidates, generally they were able to present systematic work. The moderate candidates seemed to make careless mistakes.

Comments on individual questions

Question 1

Candidates were able to find g and $g \circ f$, and sketch the graph of g . However, most of them were not able to state the domains correctly. They were also unable to show that $g \circ f$ exists. Many candidates were unable to get rid of the logarithms and exponents using the correct methods.

Answer: (a) $g(x) = \frac{3 + \ln 3x}{2}$, $D_g = \{x \mid x > 0\}$; (c) $(g \circ f)(x) = x + \frac{1}{2} \ln 3$, $D_{g \circ f} = \{x \mid -\infty < x < \infty\}$;
(d) $t = -\ln 2$

Question 2

For the first part, most of the candidates were unable to prove the formula. For the second part, the candidates were also unable to show that it is a geometric series. Most of them just compared $\frac{u_1}{u_2}$ with $\frac{u_2}{u_1}$, which was wrong. They also did not deduce S_∞ but instead used the formula $\frac{a}{1-r}$.

Answer: (b) Not independent because $\sum_{r=1}^n u_r = -\frac{4}{3} \left[1 - \left(-\frac{4}{5} \right)^n \right]$, $\sum_{r=1}^{\infty} u_r = -\frac{4}{3}$

Question 3

Most of the candidates were able to reduce the augmented matrix into row echelon form. However, they were unable to draw the right conclusion. There were some candidates who did not write in the correct augmented form because the last column is zero.

Answer: Unique solution, $m \neq -3$, infinitely many solutions, $m = -3$

Question 4

Most of the candidates were able to find the value of k for which the limit exists. But they were not able to sketch the graph correctly. Some of them did not know about left-hand and right-hand limits.

Answer: (a) $k = 2$

Question 5

Most of the candidates were able to calculate the integral correctly, because the answer was given. Two methods were used, one was substitution and the other was integration by parts. Those who did well mainly used substitution, whereas those who used integration by parts did do that well.

Question 6

Most of the candidates were able to use technique of separable variable to solve the differential equation, but they were not able to sketch the graph. Some candidates used integral factor to solve the differential equation.

Answer: $y = 1 - \frac{3}{2 + 2x^2}$

Question 7

Many candidates did not try this question. Those candidates who tried also did badly.

Answer: $\begin{pmatrix} 1 & \frac{1}{2} & 0 \\ 0 & 1 & 0 \\ 0 & -\frac{1}{4} & 1 \end{pmatrix}$ and $\begin{pmatrix} -1 & -\frac{1}{2} & 0 \\ 0 & -1 & 0 \\ -1 & \frac{1}{4} & -1 \end{pmatrix}$

Question 8

Most of the candidates chose this question. They were able to find the local maximum and minimum, x -intercepts of the curve and sketch the curve. However, they were not able to find the area correctly. They did not know that integration of a curve below the x -axis will give a negative value.

A few candidates failed to differentiate correctly even though it was just a simple polynomial equation. Many candidates failed to use the third derivative test to show that the origin is an inflexion point.

Answer: (a) Minimum, $x = 4$, maximum, $x = -4$; (c) $x = 0$, $x = 4\sqrt{3}$, $x = -4\sqrt{3}$; (d) Area = 192 unit²

MATHEMATICS (M) (950/2)

OVERALL PERFORMANCE

In Semester 2, 879 candidates sat for the examination of this subject and 64.85% of them obtained a full pass.

The percentage of each grade is as follows:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percentage	9.67	6.94	8.99	8.99	11.15	9.78	9.33	5.35	6.48	3.41	19.91

CANDIDATES' RESPONSES

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. The answers presented by “good candidates” showed full understanding of statistical concepts with nearly perfect working. They showed a systematic analysis of the problems and good planning in their answers.

Comments on individual questions

Question 1

The performance of the candidates was moderate. Some of the candidates were unable to plot the cumulative curve where they used incorrect boundaries on x -axis and the scale is not uniform. For part (b), some candidates lost marks because they do not convert the answer estimated from graph from “less than 100” to “greater than 100”.

Question 2

Overall candidates' performance to this question was poor. Majority of candidates unable to interpret $P(M|C) = 0.35$ correctly, but they write it as $P(M) = 0.35$. Hence, they answer independent in answering part (a)(i). For part (b), some candidates do not show the steps clearly both events are not independent.

Answer: (a) (i) 0.21, (ii) 0.31, (iii) 0.39 ; (b) Not independent because $P(M \cap C) \neq P(M) \times P(C)$

Question 3

The performance of the candidates was moderate. For part (a), some candidates did not analyse the question correctly with correct inequality “at least”, they ended up with equal sign ($p = 0.58$). For part (b), the common mistake was calculating the standard deviation using variance formula and/or the answer was not stated in “thousand RM”.

Answer: (a) $p = 0.58$; (b) Standard deviation = RM2 049.39

Question 4

Overall, the performance of the candidates was good. Almost all the candidates answered part (a) correctly. The common mistake was “did not use tied rank”.

Answer: (a) $r = -0.3125$; (b) Student B as no change in the rank

Question 5

Overall, the performance of candidates was good. The common mistake was “do not use value in 2 significant figures in the following parts” and minority of candidates used the wrong formula in parts (b) and (c), and did not interpret the answer correctly.

Answer: (a) $x = 68$; (c) 120.16, increased by 20.16%

Question 6

Some candidates failed to obtain full mark for part (a) due to too early approximation. Many candidates were able to apply additive model to calculate the seasonal index and seasonally adjusted time series.

Answer: (b) on average RM29 310 above the trend

Question 7

Majority of candidates were able to answer part (a)(i) but failed to answer parts (a)(ii) and (iii). For part (b), candidates were able to recognise binomial distribution to be used.

Answer: (a) (ii) $k = 557.44$, (iii) 0.36569 ; (b) 0.08039

Question 8

Most of the candidates attempted to answer this question and the overall performance was good. Majority of the candidates were able to plot the scatter diagram and estimate the inflation rate using the fitted equation.

Some common mistakes in this question were

- (i) Most of the candidates failed to choose the appropriate linear transformation equation and state the reason in part (a).
- (ii) For part (b), a number of candidates lost marks because they did not transform the data using the appropriate linear transformation equation to calculate the Pearson Correlation coefficient and find least squares regression coefficients.

Answer: (b) (i) $r = 0.94882$, (ii) $\beta = 7.43$ and $\alpha = 1.25$, (iii) 3.1075

MATHEMATICS (M) (950/3)

OVERALL PERFORMANCE

In Semester 3, 874 candidates sat for the examination of this subject and 78.03% of them obtained a full pass.

The percentage of each grade is as follows:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Percentage	10.18	8.81	3.66	11.90	15.79	18.19	9.50	4.35	3.09	2.86	11.67

CANDIDATES' RESPONSES

General comments

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

The answers presented by good candidates showed a 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 was moderate. Most of the candidates responded poorly, especially in part (b). Most of them used the wrong formula (present value instead of future value) in calculating the value of R . Some candidates were not familiar on how to calculate the compounded loan when the debt was discharged at the end of the 10 years. The candidates rarely answered part (b) correctly. Most of the candidates could only obtain the marks from part (a).

Answer: (a) RM66 333.88 ; (b) RM61 815.62

Question 2

The performance of the candidates was moderate. Some candidates did not read the question carefully hence failed to notice the equation $\mu = 3\,000 - \frac{x}{20}$ is a demand equation. They mixed up with profit function and ended up with using wrong function to obtain the maximum profit. Thus, most candidates were unable to obtain the quantity that would bring the maximum profit. Some candidates were carelessly obtained the optimal solution without testing.

Answer: 29 000 sets

Question 3

Candidates failed to obtain type of solution correctly because they unable to draw the objective function and shaded the feasible region correctly. For part (b), the good candidates were able to construct the initial and second simplex tableau but most of them unable to deduce condition in the final tableau in order to obtain the type of solution.

Question 4

Most of the candidates lost marks because their resource histogram did not prefill the condition not more than three workers. Besides that, quite a number of students cannot obtain mark because did not draw resource histogram on graph paper.

Answer: (a) $r = -0.3125$; (b) Student *B* as no change in the rank

Question 5

The performance of candidates was quite good for part (a). However, many candidates faced some problems for part (b). Some candidates were confused on the quantity for basic EOQ model and quantity for EOQ model with planed shortage when trying to determine the backordered.

Answer: (a) 174 units; (b) Backorder inventory policy should be adopted

Question 6

The performance of the candidates was quite good. Most of the candidates could show why the game did not have a stable solution but some of them mistook the two value of maximin and minimax. Many candidates could obtain the elimination method but unable to deliver a clear statement for the reason why strategy block would not choose.

Answer: (b) Block because it is a dominated strategy ; (b) Optimal mixed strategy $\left(\frac{8}{11}, 0, \frac{3}{11}\right)$,

$$\text{Expected gain} = \frac{26}{11}$$

Question 7

Most of the candidates could draw an AON network but quite a number of candidates not managed to get full mark because did not draw the key. Some candidates made mistake in calculating the total float and could not explain the effect on completion time.

Answer: (c) *U-W-Y*, 20 days ; (d) Completion time increased to 22 days

Question 8

The performance of the candidates was good. Candidates understood that the question was required them to calculate the optimal order quantity, minimum total inventory cost, the number of orders, cycle time and reorder point, but majority of them did not consider the effective lead time. Some candidates made careless mistakes when applying the formulae for the annual total inventory cost and some of them did not add in the purchasing cost. For sketching the inventory graph, some candidates did not label the graph completely.

Answer: (a) 67 units ; (b) RM61 200 ; (c) 7.5 times, 40 days; (d) 9 units