

**PEJABAT PELAJARAN DAERAH SABAK BERNAM
d/a SEKOLAH KEBANGSAAN SERI MAKMUR
45300 SUNGAI BESAR
SELANGOR**

PEPERIKSAAN PERCUBAAN DAERAH SABAK BERNAM

**MATHEMATICS T/S PAPER 1
950/1 , 954/1
3 HOURS**

Instruction:

Answer all the questions.

All necessary working should be shown clearly

Non-exact numerical answers may be given correct to three significant figures, or one decimal places in the case of angles in degree, unless a different level of accuracy is specified in the question.

1. Prove that $A - (B \cap C) = (A - B) \cup (A - C)$. [4 marks]

2. Given that $\frac{z}{z+2} = 2-i$, find $|z|$. [7 marks]

3. When $f(x)$ is divided by $x - 1$ and $x + 2$, the remainder are 2 and 3 respectively.
Find the remainder when $f(x)$ is divided by $x^2 + x - 2$. [5 marks]

4. Find $\sum_{k=1}^n \frac{1}{k(k+2)}$ in terms of n . [8 marks]

5. Given that $f(x) = \begin{cases} 2x + 7 & -2 < x < a \\ x^2 + 4 & a < x < 5 \\ 3x - 7 & x > 5 \end{cases}$

a) If $f(x)$ is continuous at $x = a$, find the value of a . [5 marks]

b) Determine whether $f(x)$ is continuous at $x = 5$ [3 marks]

6. Find the solution set of $\frac{|x|+4}{1-2|x|} < 7$ [7 marks]

7. Given that $y = \frac{e^{-x}}{1+x^2}$. Find $\frac{dy}{dx}$.

Hence, show that $(1+x^2)\frac{dy}{dx} + (1+x)^2 y = 0$ [4 marks]

8. (a) Given that $A = \begin{pmatrix} 1 & 1 \\ 2 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 3 \\ -2 & -1 \end{pmatrix}$

Find the matrix X such that $AXA^{-1} = B$ [6 marks]

(b) Given $A = \begin{pmatrix} 1 & 0 & 1 \\ 0 & \frac{1}{2} & -3 \\ -4 & 0 & k^2 \end{pmatrix}$. Show that A is a non-singular matrix for all real values of k [4 marks]

9. Write down the equation of a straight line which has a gradient $\frac{1}{m}$ and passes through the point $(3,5)$.
Find in terms of m , the coordinate of S , the mid point of any chord of parabola $y^2 = 16x$ which passes through the point $(3,5)$.
Deduce the locus of S when m varies. [9 marks]

10. a) Expand $(1+2x)^{\frac{1}{5}}$ in ascending power of x until the term in x^2 . [3 marks]

By taking $x = \frac{1}{100}$, find the approximation for $32.64^{\frac{1}{5}}$, correct to five decimal places. [4 marks]

b) Find the sum of the positive integers, less than 500 which are multiples of 4. [3 marks]

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11 (a) By using substitution method find $\int_{-1}^2 \frac{x}{(2x+3)^3} dx$. [6 marks]

(b) Sketch the curve $y = \frac{1}{\sqrt{x}}$ from $x = 1$ to $x = 4$. Find the area of the region R

bounded by the curve, the x-axis and the lines $x = 1$ and $x = 4$

When the region R is rotated through 2π radians about x-axis, a solid of the revolution is formed. Use the trapezium rule with 7 ordinates to find an approximation to the volume of this solid, correct to the three significant figures [8 marks]

12. The equation of a curve is $y = \frac{x}{(x+1)^2}$

(a) State the asymptotes [1 mark]

(b) Find the stationary point [3 marks]

(c) Sketch the graph of the curve [3 marks]

(d) By drawing a suitable graph on the above diagram, determine the number of real roots of the equation $\frac{x}{(x+1)^2} = x^2$

Show that the positive real root is between 0.4 and 0.5

Using the Newton-Raphson method and 0.5 as the first approximation, find positive real root correct to 2 decimal places. [7 marks]



PEPERIKSAAN
PERCUBAAN STPM
2008

MATEMATIK S (MATHEMATICS S)
KERTAS 2(PAPER 2)

TIGA JAM
(THREE HOURS)

Arahan kepada calon :

Jawab *semua* soalan.

Semua kerja yang perlu hendaklah ditunjukkan dengan jelas.

Jawapan berangka tak tepat boleh diberikan betul hingga tiga angka bererti, atau satu tempat perpuluhan dalam kes sudut dalam darjah, kecuali aras kejituan yang lain ditentukan dalam soalan.

Sifir matematik dan kertas graf dibekalkan.

Instructions to candidates :

Answer *all* questions.

All necessary working should be shown clearly.

Non-exact numerical answers may be given correct to three significant figures, or one decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

Mathematical tables and graph papers are provided.

Kertas soalan ini terdiri daripada 6 halaman bercetak
(This question paper consists of 6 printed pages)

1. The ages of patients visiting a clinic on a particular day are as follows.

18	18	20	30	26	28	18
19	20	8	19	21	43	19
21	51	20	19	20	22	20
19	20	19	64	19	18	19
21	62	19	20	22	19	23

- (a) Construct an ordered stemplot to display the above data. [2 marks]
- (b) State a measure of central location that best describe the data. Give a reason for your answer. [2 marks]

2. The amounts of purchase and the modes of payment of 300 customers of a supermarket are shown in the following table.

Amount of purchase	Mode of payment	
	Cash	Credit card
Less than RM50	50	25
RM50 or more	75	150

A customer is selected at random from this group of customers.

- (a) Find the probability that the payment is made by cash [1 mark]
- (b) Find the probability that the amount of purchase is less than RM50 and the payment is made by cash. [1 mark]
- (c) If the amount of purchase is at least RM50, find the probability that the payment is made by cash. [1 mark]
- (d) Find the probability that the amount of purchase is less than RM50 given that the payment is made by cash. [1 mark]
- (e) State, with a reason, whether the events "the amount of purchase is less than RM50" and "the payment is made by cash" are mutually exclusive. [2 marks]
- (f) State, with a reason, whether the events "the amount of purchase is less than RM50" and "the payment is made by cash" are independent. [2 marks]

3. A computer manufacturing company produces three types of computer: home desktop, business desktop and notebook. Each type of computer need to pass through three machines: Machine A, machine B and Machine C. The profits for a home desktop, a business desktop and a notebook are RM200, RM350 and RM450 respectively. The table below shows the number of hours required to produce a home desktop, a business desktop and a notebook and the number of man-hours available per week.

Machine	Number of hours required			Number of Man-hours available per week
	Home desktop	Business desktop	Notebook	
A	5	6	8	400
B	10	12	12	648
C	2	4	2	60

- (a) Formulate the problem as a linear programming problem [4 marks]
- (b) Using the simplex method, find the number of each type of computer to be produced to maximise the weekly profit and find this maximum profit [9 marks]
4. The following table shows the activities, their preceding activities and their durations for a project.

Activity	Preceding activities	Duration(weeks)
A	-	7
B	A	3
C	A	3
D	B,C	4
E	B	5
F	A	3
G	D,E,F	6

- (a) Draw an activity network for the project. [3 marks]
- (b) Construct a table which shows the earliest start time, earliest finish time, latest start time, latest finish time, total float, free float and independent float for each activity. [7 marks]
- (c) Determine the critical path and the minimum time required to complete the project. [2 marks]
- (d) If the duration of activity D has to be extended to 8 weeks, determine the number of weeks the project will be delayed. [3 marks]

5. Eight pairs of values obtained from a random observations on two variables x and y are (4, 63), (2, 89), (5, 58), (3, 73), (4, 72), (5, 48), (3, 75) and (2, 84).

- (a) Plot these values on a scatter diagram. [2 marks]
- (b) State, with a reason, whether the scatter diagram in (a) displays positive or a negative correlation. [2 marks]
- (c) Obtain the equation of the regression line of y on x in the form $y = a + bx$, where a and b are given to three decimal places. [5 marks]
- (d) Estimate the value of y corresponding to $x = 4.5$ [2 marks]

6. The following table shows the number of shop lots sold through a business scheme from the first quarter of year 2004 to the fourth quarter of year 2007 and the centred moving averages.

Year	Quarter	Number of shop lots	Centred moving average
2004	1	112	
	2	118	
	3	155	120.875
	4	95	122.750
2005	1	119	125.375
	2	126	128.875
	3	168	132.000
	4	110	133.250
2006	1	129	135.000
	2	126	139.875
	3	182	143.875
	4	135	147.125
2007	1	136	151.125
	2	145	155.625
	3	195	
	4	158	

- (a) Plot the time series for the above data and give comments on the time series plot. [3 marks]
- (b) Using an additive model, calculate the adjusted seasonal variation for each of the four quarters [5 marks]

7. The table below shows the average daily wage and the number of workers for three job categories in a factory for the years 2006 and 2007.

Year	Operator		Clerk		Supervisor	
	Wage (RM)	Number of workers	Wage (RM)	Number of workers	Wage (RM)	Number of workers
2006	15.50	65	17.00	24	21.50	10
2007	19.00	95	22.50	28	28.50	15

Taking 2006 as the base year, calculate

- (a) the Laspeyres index for the number of workers in year 2007 [2 marks]
 (b) the Paasche index for the average wage in year 2007 [2 marks]
8. The number of requests, X received by a company to deliver pianos in a day is a discrete random variable having probability distribution function

$$P(X = x) = \begin{cases} 2k^x & , \quad x = 0, 3 \\ kx & , \quad x = 1, 2 \\ 0 & , \quad \text{otherwise} \end{cases}$$

- (a) Determine the value of the constant k and construct a probability distribution table for X . [3 marks]
 (b) Find the probability that the company receives at least two requests in a day. [2 marks]
 (c) Find the expected number of requests per day. [2 marks]
9. The table below shows the duration, in seconds, taken by 100 workers to finish a task.

Duration (x seconds)	Number of workers
$0 < x \leq 100$	2
$100 < x \leq 200$	10
$200 < x \leq 250$	20
$250 < x \leq 300$	26
$300 < x \leq 350$	24
$350 < x \leq 400$	10
$400 < x \leq 500$	8

- (a) Calculate an estimate of the mean [2 marks]
 (b) Plot a histogram for the above data. Hence, estimate the mode. [5 marks]

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(c) Plot a relative cumulative frequency curve for the above data. Hence, determine the median and the percentage of workers who finish the task in more than 270 seconds. [6 marks]

10. In a market survey, 40% of the people in the city regularly ordered white cappuccino coffee during their tea break. A preliminary survey of 100 people in the city is conducted to find out their preferences.

(a) Determine the sampling distribution of the proportion who will order white cappuccino during their tea break. [3 marks]

(b) Find the probability that at least 30% of the people will order white cappuccino during their tea break. [3 marks]

11. The time taken by a student to travel from his home to his school is normally distributed with mean 45 minutes and standard deviation 3 minutes. Determine the time when the student has to leave his house so that he is 95% confident of arriving at the school by 8.00 am. [5 marks]

12. For 10 pairs of random bivariate(x,y), the data are summarised as follows:

$$\sum x = 200, \sum y = 150, \sum x^2 = 4904, \sum y^2 = 2602, \sum xy = 2990$$

(a) Find the Pearson's correlation coefficient and comment on your result. [4 marks]

(b) Find the value of y if x = 26. [2 marks]