

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENGAJIAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR

SESI JUN 2014

**BA301 : ENGINEERING MATHEMATICS 3**

**TARIKH : 28 OKTOBER 2014**  
**MASA : 8.30 AM - 10.30 AM (2 JAM)**

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Kertas ini mengandungi **EMPAT BELAS (14)** halaman bercetak.

Bahagian A: Struktur (2 soalan)

Bahagian B: Struktur (4 soalan)

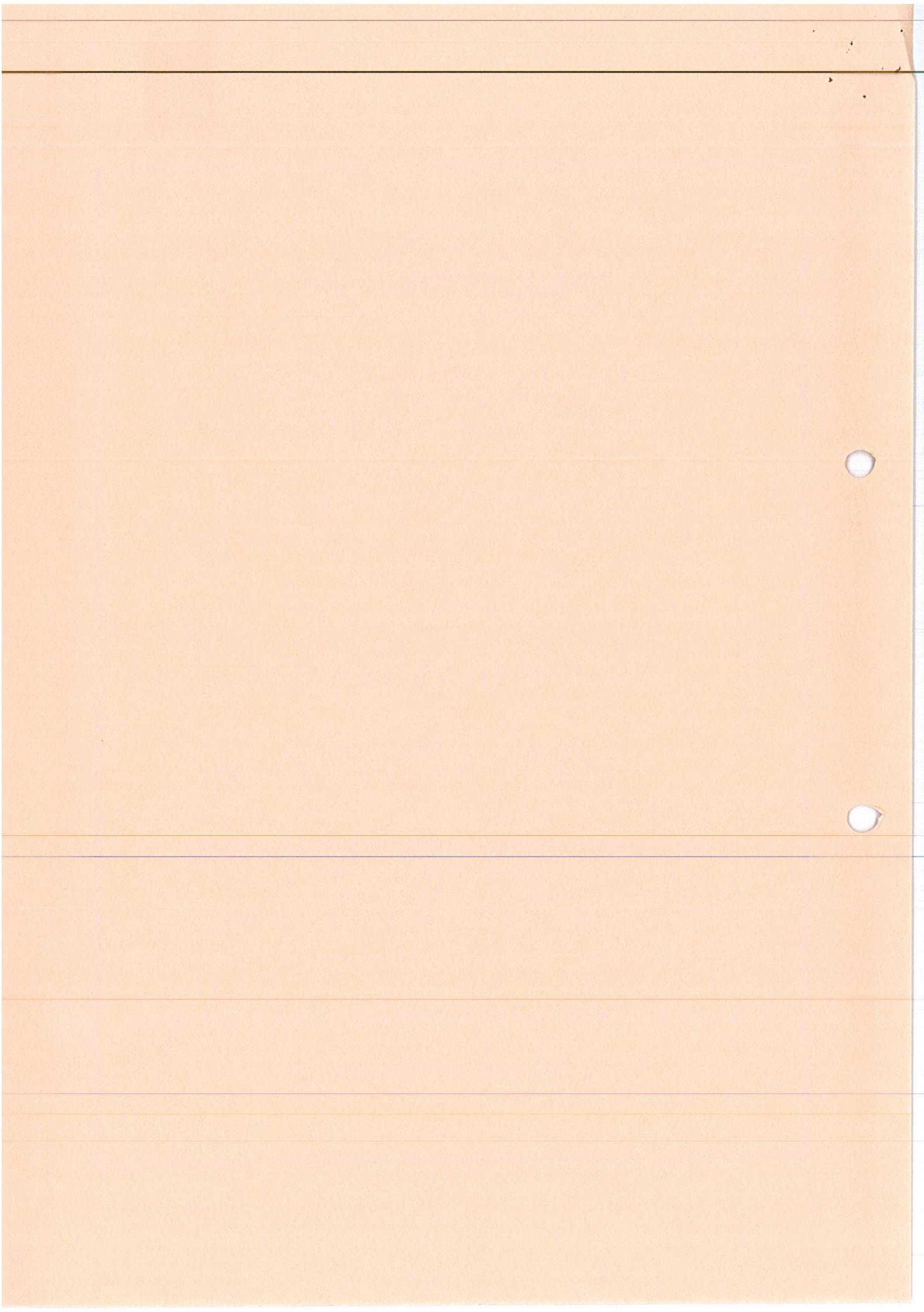
Dokumen sokongan yang disertakan : Kertas Graf dan Formula

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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

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**SECTION A: 25 MARKS****BAHAGIAN A: 25 MARKAH****INSTRUCTION :**

This section consists of **TWO (2)** structured questions. Answer **ONE (1)** question only.

**ARAHAN:**

Bahagian ini mengandungi **DUA (2)** soalan struktur. Jawab **SATU (1)** soalan sahaja.

**QUESTION 1****SOALAN 1**CLO1  
C1

- a) The pie chart in the figure 1 below shows the number of trees planted at Pak Din's orchard. The total number of trees are 120.

*Carta pai dalam rajah 1 di bawah menunjukkan bilangan pokok yang ditanam dalam dusun Pak Din. Jumlah semua batang pokok yang ada ialah 120.*

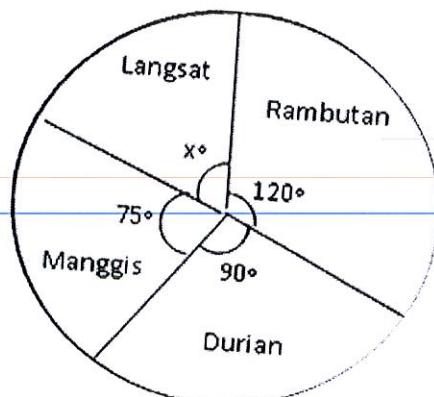


Figure 1/Rajah 1

According to the pie chart:

Berdasarkan carta pai di atas:

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- i. Find the value of  $x$ .

*Hitungkan nilai x.*

[2 marks]  
[2 markah]

- ii. How many 'langsat' trees are planted?

*Berapakah bilangan pokok langsat yang ditanam?*

[2 marks]  
[2 markah]

- iii. Calculate the total and the percentage of two most planted trees at Pak Din orchard.

*Dapatkan jumlah batang pokok serta peratusnya bagi 2 jenis pokok yang paling banyak ditanam di dusun Pak Din.*

[4 marks]  
[4 markah]

CLO1  
C1

- b) Table 1 below shows width of the leaf (cm) collected by students from an experiment.

The total leaves collected are 30.

*Jadual 1 di bawah menunjukkan lebar daun (cm) yang dikumpul dari satu ujikaji. Jumlah daun yang dikumpulkan adalah 30 helai.*

Leaf width (cm)	Frequency
4.1 - 4.5	3
4.6 - 5.0	4
5.1 - 5.5	x
5.6 - 6.0	5
6.1 - 6.5	3
6.6 - 7.0	5
7.1 - 7.5	2
7.6 - 8.0	2

Table 1/ Jadual 1

According to Table 1:

Berdasarkan Jadual 1:

- i. How many leaves with 5.1 – 5.5 cm width?

Dapatkan bilangan daun yang mempunyai lebar 5.1 – 5.5 cm?

[2 marks]

[2 markah]

- ii. If the average width of the leaves is 5.6 – 6.5 cm, find the percentage of the average leaves size with average size.

Jika lebar daun antara 5.6 – 6.5 adalah bersaiz sederhana, berapa peratuskah bilangan daun yang mempunyai saiz sederhana tersebut?

[3 marks]

[3 markah]

- iii. From Table 1, draw a histogram.

Bina histogram daripada Jadual 1 diatas.

[5 marks]

[5 markah]

- iv. Draw an ogive “less than” from this distribution.

Lukiskan ogif “kurang daripada” bagi taburan ini.

[7 marks]

[7 markah]

**QUESTION 2****SOALAN 2**CLO1  
C3

- a) The daily salary earned by employees at Mesra Company are as follows:

*Berpandukan gaji harian bagi pekerja di sebuah Syarikat Mesra di bawah:*

Daily salary (RM)	Frequency of employees
35-37	4
38-40	8
41-43	12
44-46	3
47-49	3

- i) Determine the mean.

*Hitungkan min.*

[5 marks]  
[5 markah]

- ii) Present a histogram and determine the mode by using the

histogram.

*Lukiskan sebuah histogram dan dapatkan mod daripada histogram tersebut.*

[5 marks]  
[5 markah]

- iii) Find the median by using the formula.

*Dapatkan median dengan menggunakan rumus.*

[5 marks]  
[5 markah]

- b) The table shows the distribution age of the contestant in a marathon

*Jadual berikut menunjukkan taburan umur peserta suatu perlumbaan maraton.*

CLO1  
C3

Age	Frequency
15-24	22
25-34	30
35-44	24
45-54	17
55-64	7

Determine the mean deviation and the variance of the data given.

*Dapatkan sisihan min dan varians bagi data tersebut*

[10 marks]  
[10 markah]

**SECTION B : 75 MARKS**  
**BAHAGIAN B : 75 MARKAH**

**INSTRUCTION:**

This section consists of **FOUR (4)** subjective questions. Choose **THREE (3)** questions only.

**ARAHAN :**

Bahagian ini mengandungi **EMPAT (4)** soalan subjektif. Pilih **TIGA (3)** soalan sahaja.

**QUESTION 3****SOALAN 3**

CLO2

C3

- a) Given an equation,  $y = \frac{5x^2 + 4}{1+x^3}$ .

Diberi satu persamaan,  $y = \frac{5x^2 + 4}{1+x^3}$ .

- i) Complete the Table 1 below by giving the answers to 4 decimal places.

Lengkapkan jadual di bawah dengan memberikan jawapan dalam 4 tempat perpuluhan.

[5 marks]  
[5 markah]

x		0	2		6	8	10
y	-3.4286		2.6667		0.8479		0.5035

Table 1 / Jadual 1

- ii) Calculate the integration of  $\int_{-2}^{10} \left( \frac{5x^2 + 4}{1+x^3} \right) dx$  by using Trapezium Rule.

Give your answer exactly to 3 decimal places.

Kirakan pengamiran  $\int_{-2}^{10} \left( \frac{5x^2 + 4}{1+x^3} \right) dx$  dengan menggunakan Petua Trapezium. Berikan jawapan anda tepat kepada 3 tempat perpuluhan.

[7 marks]  
[7 markah]

CLO2  
C3

- b) By using the Simpson's Rule , estimate  $\int_1^3 \frac{e^{2x}}{3} dx$  with the width of 0.25.

Dengan menggunakan Petua Simpson, anggarkan  $\int_1^3 \frac{e^{2x}}{3} dx$  untuk lebar selang sebanyak 0.25.

[13 marks]  
[13 markah]

**QUESTION 4**  
**SOALAN 4**

CLO2  
C3

- a) Given 55 and 119 are the 4<sup>th</sup> and 8<sup>th</sup> term of an Arithmetic Progression. Calculate the first term.

*Di beri 55 dan 119 adalah sebutan ke-4 dan ke-8 dalam Janjang Aritmetik. Kirakan sebutan pertama.*

[5 marks]  
[5 markah]

CLO2  
C3

- b) Find the sum from twelfth to seventeenth term of an Arithmetic Progression 5, 18, 31...

*Dapatkan hasil tambah dari sebutan kedua belas hingga ketujuh belas bagi Janjang Aritmetik 5, 18, 31....*

[6 marks]  
[6 markah]

CLO2  
C3

- c) Given  $11x - 1$ ,  $2x + 2$  and  $x - 1$  is the first three terms of a Geometric Progression.
- Find the value of  $x$  (positive value only)
  - Find the first three terms of the sequence.

*Diberi  $11x - 1$ ,  $2x + 2$  dan  $x - 1$  adalah tiga sebutan pertama dalam Janjang Geometri.*

- Dapatkan nilai  $x$  (nilai positif sahaja)*
- Dapatkan tiga sebutan yang pertama dalam janjang.*

[7 marks]  
[7 markah]

CLO2  
C3

- d) Given the common ratio of a geometric progression is 0.25. Find the 7<sup>th</sup> term of the sequence if the sum of the first three terms is 4200.

*Diberi nisbah sepunya satu janjang geometri adalah 0.25. Dapatkan sebutan ke7 turutan itu jika hasil tambah tiga sebutan pertama adalah 4200*

[7 marks]  
[7 markah]

**QUESTION 5****SOALAN 5**CLO3  
C3

a) If  $A = \begin{pmatrix} 2 & 4 & 5 & 3 \\ 1 & 7 & 0 & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} 3 & 5 & 2 & 7 \\ 9 & 4 & 6 & 3 \end{pmatrix}$

Jika  $A = \begin{pmatrix} 2 & 4 & 5 & 3 \\ 1 & 7 & 0 & 4 \end{pmatrix}$  dan  $B = \begin{pmatrix} 3 & 5 & 2 & 7 \\ 9 & 4 & 6 & 3 \end{pmatrix}$

i) Find  $B - A$

Cari  $B - A$

[2 marks]  
[2 markah]

ii) Find  $3A + 2(A - B)$

Cari  $3A + 2(A - B)$

[4 marks]  
[4 markah]

iii) Find  $AB^T$

Cari  $AB^T$

[3 marks]  
[3 markah]

b) Solve the linear system equation by using Cramer's rule.

Selesaikan sistem persamaan linear berikut menggunakan Petua Cramer.

[16 marks]  
[16 markah]

$$-2a + 3b - c = 1$$

$$a + 2b - c = 4$$

$$-2a - b + c = -3$$

**QUESTION 6****SOALAN 6**CLO3  
C3

- a) Determine the value of  $x$ ,  $y$  and  $z$  from the linear equation below by using **Doolittle Method**.

Tentukan nilai bagi  $x$ ,  $y$  dan  $z$  dari persamaan linear berikut menggunakan kaedah pemfaktoran “**Doolittle**”.

$$3x + y = 2$$

$$x - y - z = 3$$

$$2y + 2z = 2$$

[16 marks]  
[16 markah]

CLO3  
C3

- b) Find the root for equation  $x^3 - 5x - 16 = 0$  correct to the 4 decimal places with an initial assumption of  $x_0 = 3.5$  by using **Fixed Point Iteration Method**.

Dapatkan nilai punca benar untuk persamaan  $x^3 - 5x - 16 = 0$  kepada empat tempat perpuluhan dengan andaian nilai  $x_0 = 3.5$  menggunakan **Kaedah Lelaran Titik Tetap**.

[9 marks]  
[9 markah]

**SOALAN TAMAT**

## FORMULA OF ENGINEERING MATHEMATICS 3 (BA301)

<b>Descriptive Statistics</b>		
Mean	$\bar{x} = \frac{\sum x}{n}$	$\bar{x} = \frac{\sum (fx)}{\sum f}$
Median		Median = $L + \left[ \frac{\frac{N}{2} - F}{f_m} \right] C$
Mode		Mode = $L_{Mo} + \left[ \frac{d_1}{d_1 + d_2} \right] C$
First Quartile		$Q_1 = L + \left[ \frac{\frac{N}{4} - F}{f_m} \right] C$
Third Quartile		$Q_3 = L + \left[ \frac{\frac{3N}{4} - F}{f_m} \right] C$
Decil		$D_k = L + \left[ \frac{\frac{k}{10} N - F}{f_{DK}} \right] C$
Percentile		$P_K = L + \left[ \frac{\frac{k}{100} N - F}{f_{PK}} \right] C$
Mean Deviation	$E = \frac{\sum  x - \bar{x} }{n}$	$E = \frac{\sum ( x - \bar{x}  f)}{\sum f}$
Variance	$s^2 = \frac{\sum (x - \bar{x})^2}{n}$	$s^2 = \frac{\sum_{i=1}^n x_i^2 - n\bar{x}^2}{n}$
	$s^2 = \frac{\sum [(x - \bar{x})^2 f]}{\sum f}$	$s^2 = \frac{\sum fx^2}{\sum f} - \left[ \frac{\sum fx}{\sum f} \right]^2$
Standard Deviation	$s = \sqrt{\text{variance}}$	

## FORMULA OF ENGINEERING MATHEMATICS 3 (BA301)

Area of Irregular Shape	
Trapezium Rule	$\int_a^b f(x)dx = \frac{h}{2} (y_0 + 2y_1 + 2y_2 + \dots + 2y_{n-1} + y_n)$
	$\int_a^b f(x)dx = h \left( \frac{1}{2} f(a) + f(x_1) + \dots + f(x_{n-1}) + \frac{1}{2} f(b) \right)$
	$\int_a^b f(x)dx = \frac{h}{2} [(y_0 + y_n) + 2(y_1 + y_2 + \dots + y_{n-1})]$
	$\int_a^b f(x)dx = \frac{h}{2} [(y_0 + y_n) + 2 \sum (f_{odd} + f_{even})]$
	$\int_a^b f(x)dx = \frac{h}{2} [(y_0 + y_n) + 2 \sum y(others)]$
Simpson's Rule	$\int_a^b ydx = \frac{h}{3} (f_0 + 4f_1 + 2f_2 + 4f_3 + \dots + 4f_{n-1} + f_n)$
	$\int_a^b f(x)dx = \frac{h}{3} (f(a) + 4 \sum f(odd\ number) + 2 \sum f(even\ number) + f(b))$
	$\int_a^b f(x)dx = \frac{h}{3} [(y_0 + y_n) + 4(y_1 + y_3 + \dots + y_{n-1}) + 2(y_2 + y_4 + \dots + y_{n-2})]$

Progression			
Arithmetic Progression	$T_n = a + (n-1)d$	$T_n = S_n - S_{n-1}$	
	$d = T_n - T_{n-1}$		$S_n = \frac{n}{2} [2a + (n-1)d]$
Arithmetic Mean	$AM = \frac{T_{n-1} + T_{n+1}}{2}$		
Geometric Progression	$T_n = ar^{n-1}$	$T_n = S_n - S_{n-1}$	$r = \frac{T_n}{T_{n-1}}$
	$S_n = \frac{a(1-r^n)}{1-r}$	$S_n = \frac{a(r^n - 1)}{r-1}$	$S_\infty = \frac{a}{1-r}$
Geometric Mean	$GM = \sqrt{T_{n-1} \times T_{n+1}}$		

Matrix	
Cofactor	$C = (-1)^{i+j} M_{ij}$
Adjoint	$Adj(A) = C^T$
Inverse of Matrix	$A^{-1} = \frac{1}{ A } Adj(A)$

## FORMULA OF ENGINEERING MATHEMATICS 3 (BA301)

Numerical Method	
CROUT Method	$A = \begin{pmatrix} l_{11} & 0 & 0 \\ l_{21} & l_{22} & 0 \\ l_{31} & l_{32} & l_{33} \end{pmatrix} \begin{pmatrix} 1 & u_{12} & u_{13} \\ 0 & 1 & u_{23} \\ 0 & 0 & 1 \end{pmatrix}$
Doolittle Method	$A = \begin{pmatrix} 1 & 0 & 0 \\ l_{21} & 1 & 0 \\ l_{31} & l_{32} & 1 \end{pmatrix} \begin{pmatrix} u_{11} & u_{12} & u_{13} \\ 0 & u_{22} & u_{23} \\ 0 & 0 & u_{33} \end{pmatrix}$
Cholesky Method	$A = LL^T$
Newton Raphson Method	$x_0 = \frac{1}{y_2 - y_1} \begin{vmatrix} x_1 & y_1 \\ x_2 & y_2 \end{vmatrix} \quad x_{n+1} = x_n - \frac{f(x)}{f'(x)}$

