

SULIT



BAHAGIAN PEPERIKSAAN DAN PENILAIAN  
JABATAN PENGAJIAN POLITEKNIK  
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN MATEMATIK, SAINS DAN KOMPUTER

PEPERIKSAAN AKHIR  
SESI JUN 2014

**DBM1013 : ENGINEERING MATHEMATICS 1**

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**TARIKH : 27 OKTOBER 2014**  
**MASA : 8.30 AM - 10.30 AM (2 JAM)**

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Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Bahagian A: Struktur (3 soalan)

Bahagian B: Struktur (3 soalan)

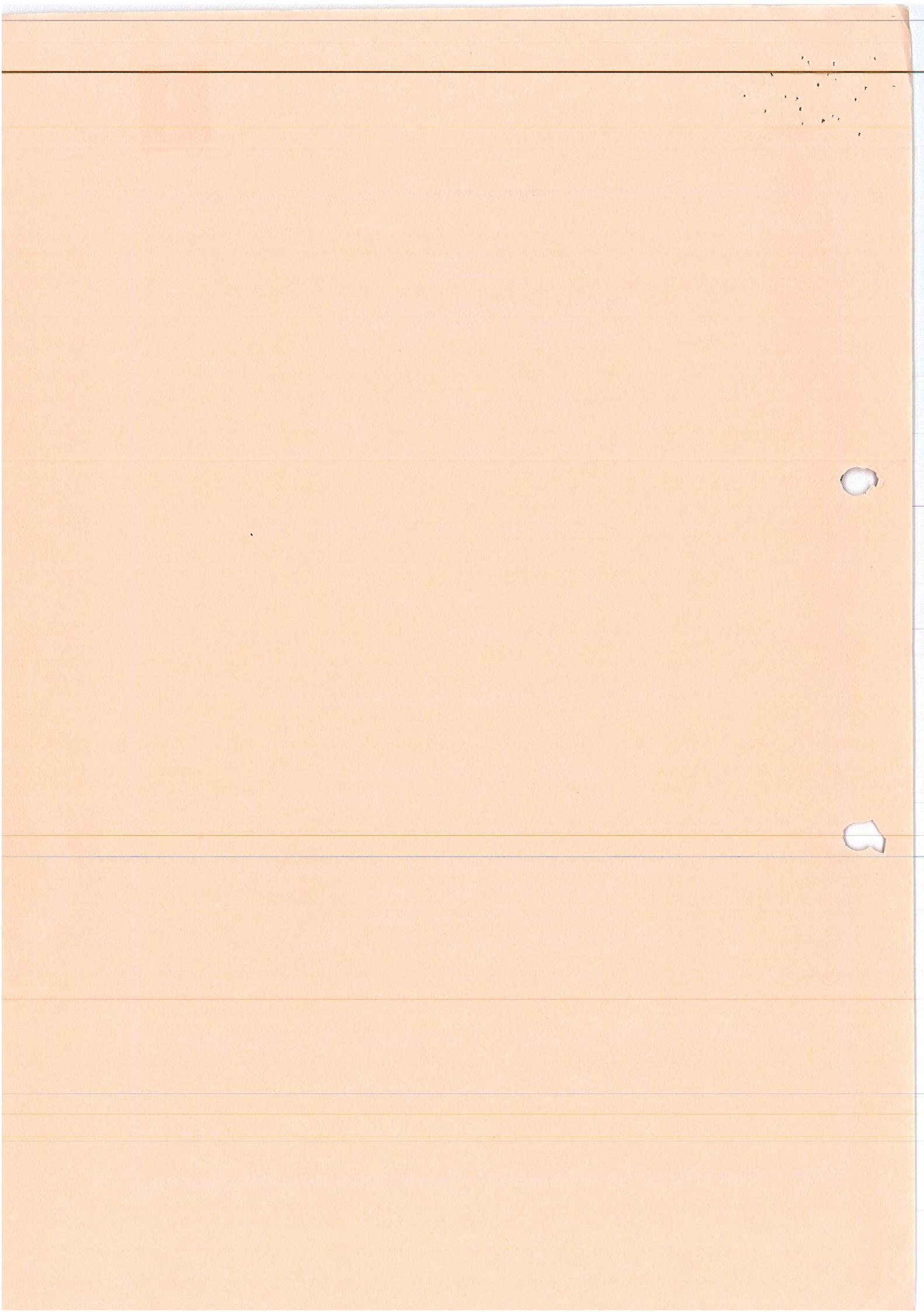
Dokumen sokongan yang disertakan : Formula

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**JANGAN BUKA KERTAS SOALANINI SEHINGGA DIARAHKAN**

(CLO yang tertera hanya sebagai rujukan)

**SULIT**



**SECTION A: 75 MARKS**  
**BAHAGIAN A: 75 MARKAH****INSTRUCTION:**

This section consists of THREE (3) structured questions. Answer **ALL** questions.

**ARAHAN:**

Bahagian ini mengandungi **TIGA (3)** soalan berstruktur. Jawab **SEMUA** soalan.

**QUESTION 1****SOALAN 1**

CLO1

C2

- (a) Simplify the following algebra expression

*Permudahkan persamaan algebra berikut*

i.  $\frac{8x^3y^4}{2x^2y}$  [3 marks]  
[3 markah]

ii.  $\frac{8a^2}{16ab}$  [2 marks]  
[2 markah]

iii.  $\frac{4a^2+2a}{2a+1}$  [2 marks]  
[2 markah]

iv.  $x(z - 4x) + x(2z + 5x)$  [3 marks]  
[3 markah]

	<b>SULIT</b>	<b>DBM1013: ENGINEERING MATHEMATICS 1</b>
CLO2 C3	(b) Find the value of the variable for the following quadratic equations: <i>Cari nilai pembolehubah bagi persamaan kuadratik berikut:</i>	
	i. $2x^2 + 13x + 15 = 0$ by using <b>Factorization</b> $2x^2 + 13x + 15 = 0$ menggunakan <b>Kaedah Pemfaktoran</b>	[4 marks] [4 markah]
	ii. $4x^2 + 5 = -9x$ by using <b>Completing The Square</b> $4x^2 + 5 = -9x$ menggunakan <b>Kaedah Penyempurnaan Kuasa Dua</b>	[7 marks] [7 markah]
	iii. $8 = 2x^2 - 5x$ by using <b>Quadratic Formula</b> $8 = 2x^2 - 5x$ menggunakan <b>Rumus Kuadratik</b>	[4 marks] [4 markah]

**QUESTION 2**  
**SOALAN 2**

CLO1  
C1

- (a) i. State the order of a matrix. [1 mark]  
*Apakah peringkat suatu matriks.* [1 markah]
- ii. List 3 types of matrices. [3 marks]  
*Senaraikan tiga jenis matriks.* [3 markah]

CLO2  
C3

- (b) Given that,  $S = \begin{pmatrix} -1 & 5 \\ 4 & -5 \\ 0 & 3 \end{pmatrix}$  and  $T = \begin{pmatrix} 4 & -2 & 1 \\ 5 & 7 & 9 \end{pmatrix}$ . Determine:  
*Diberi bahawa,*  $S = \begin{pmatrix} -1 & 5 \\ 4 & -5 \\ 0 & 3 \end{pmatrix}$  *dan*  $T = \begin{pmatrix} 4 & -2 & 1 \\ 5 & 7 & 9 \end{pmatrix}$ . *Tentukan:*
- i.  $S - T^T$  [3 marks]  
*[3 markah]*
- ii.  $T + S^T$  [3 marks]  
*[3 markah]*

CLO2  
C3

- (c) Solve the simultaneous equation below using Inverse Matrices Method. [15 marks]
- Selesaikan persamaan serentak di bawah menggunakan Kaedah Songsangan Matrik.* [15 markah]

$$x - 2y + 3z = 1$$

$$2x + 2y - z = 3$$

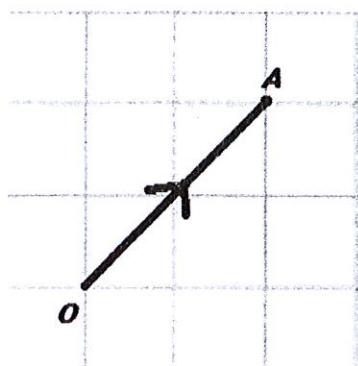
$$2x + 2y - z = -2$$

### **QUESTION 3**

### ***SOALAN 3***

CLO1 C2 (a) Diagram below shows the vector  $\overrightarrow{OA} = \underline{a}$ . By using graph paper, draw the following vectors when:

Rajah di bawah menunjukkan vektor  $\overrightarrow{OA} = \underline{a}$ . Dengan menggunakan kertas graf, lukiskan vektor yang berikut apabila:



- i.  $\overrightarrow{OP} = 2\underline{a}$  [2 marks]  
[2 markah]

ii.  $\overrightarrow{OQ} = -\frac{1}{2}\underline{a}$  [2 marks]  
[2 markah]

CLO2 C2 (b) If  $p = 2i - j + 2k$  and  $q = -3i + 2j - 4k$ , express the following in terms of  $i, j$  and  $k$ :

Jika  $p = 2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$  dan  $q = -3\mathbf{i} + 2\mathbf{j} - 4\mathbf{k}$ , nyatakan yang berikut dalam sebutan  $i$ ,  $j$  dan  $k$ :

- i.  $p + q$  [3 marks]  
[3 markah]

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ii.  $2p - 3q$  [3 marks]  
[3 markah]

CLO2  
C3

- (c) Given that  $A(3, -6, 7)$ ,  $B(3, 2, -3)$  and  $C(-2, 8, -8)$ . Find:

Diberi  $A(3, -6, 7)$ ,  $B(3, 2, -3)$  dan  $C(-2, 8, -8)$ . Dapatkan:

i.  $B \times C$  [3 marks]

[3 markah]

ii.  $C \times A$  [3 marks]

[3 markah]

iii.  $A \times B$  [3 marks]

[3 markah]

iv.  $B \bullet A$  [3 marks]

[3 markah]

v.  $C \bullet B$  [3 marks]

[3 markah]

**SECTION B: 25 MARKS**  
**BAHAGIAN B: 25 MARKAH**

**INSTRUCTION:**

This section consists of THREE (3) structured questions. Answer ONE (1) question only.

**ARAHAN:**

Bahagian ini mengandungi TIGA (3) soalan berstruktur. Jawab SATU (1) soalan sahaja.

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

CLO1  
C3

- (a) Find the partial fractions for fractions below:

Dapatkan pecahan separa bagi pecahan dibawah:

i.  $\frac{5}{(x-2)(x+3)}$  [5 marks]

[5 markah]

ii.  $\frac{3x}{(1-x)(1+2x)}$  [5 marks]

[5 markah]



CLO2  
C3

- (b) Solve the following partial fractions decomposition:

Selesaikan pecahan separa bagi setiap yang berikut:

i.  $\frac{2-6x-3x^2}{(1+x)(1-2x)^2}$  [7 mark]

[7 markah]

ii.  $\frac{2x^2+1}{x^3+2x^2+x}$  [8 marks]

[8 markah]

**QUESTION 5****SOALAN 5**CLO 1  
C3

- a) Based on the Diagram 5(a), find the following values :

*Merujuk kepada Rajah 5(a), cari nilai yang berikut :*

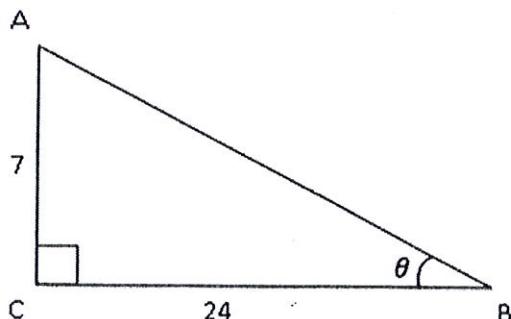


Diagram 5(a)

Rajah 5(a)

- i. The length of AB.

*Panjang AB.*

[3 marks]  
[3 markah]

- ii.  $\sec \theta$ .

*Sek θ.*

[3 marks]  
[3 markah]

CLO 1  
C3

- b) Find the value of  $\sin \theta = 0.9675$ , where  $0^\circ \leq \theta \leq 360^\circ$ .

*Cari nilai untuk  $\sin \theta = 0.9675$ , dimana  $0^\circ \leq \theta \leq 360^\circ$ .*

[4 marks]  
[4 markah]

CLO 2  
C3

- c) Solve the equation  $3 \sec^2 x = 5(1 + \tan x)$  for  $0^\circ \leq x \leq 360^\circ$ .

*Selesaikan persamaan  $3 \sec^2 x = 5(1 + \tan x)$  untuk  $0^\circ \leq x \leq 360^\circ$ .*

[9 marks]  
[9 markah]

CLO 2  
C3

- d) Referring to Diagram 5(d), calculate:

*Merujuk kepada rajah 5(d), kirakan:*

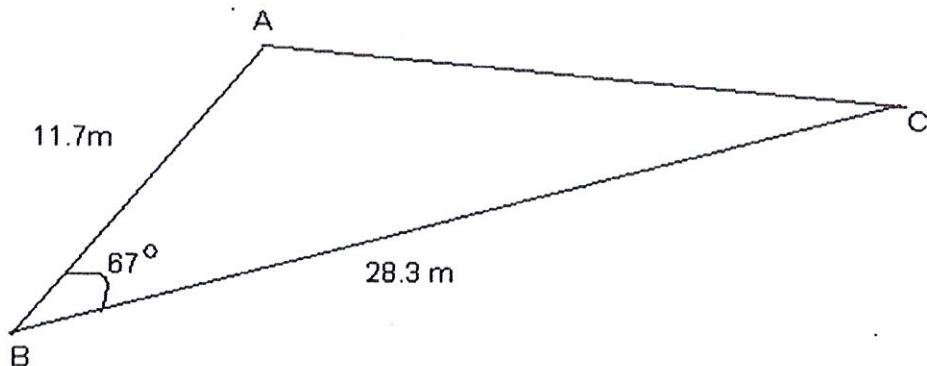


Diagram 5(d)

Rajah 5(d)

- i. Area of triangle ABC.

*Luas segitiga ABC.*

[2 marks]  
[2 markah]

- ii. Length of AC.

*Panjang AC.*

[4 marks]  
[4 markah]

**QUESTION 6**  
**SOALAN 6**

- a) Given  $z = 2 + 3i$  and  $w = 5 - 2i$ , solve each of the following expression and write the answer in  $(a+bi)$  form.

CLO1  
C2

Diberi  $z = 2 + 3i$  dan  $w = 5 - 2i$ , selesaikan setiap ungkapan yang berikut dan tulis jawapan dalam bentuk  $(a+bi)$ .

i)  $z + w$  [2 marks]

[2 markah]

ii)  $w^2$  [4 marks]

[4 markah]

iii)  $zw$  [4 marks]

[4 markah]

CLO2  
C3

- b) i. Calculate  $\frac{(8+3i)}{(2<55^\circ)}$ . Hence, write the answer into polar form and exponential form.

[10 marks]

Kirakan  $\frac{(8+3i)}{(2<55^\circ)}$ . Seterusnya, tuliskan jawapan dalam bentuk polar dan eksponen.

[10 markah]

- ii. Using conjugate method, calculate:

Dengan menggunakan kaedah konjugat, kira:

$$\frac{4+2i}{1+3i}$$

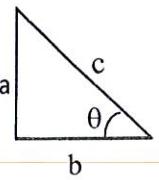
[5 marks]

[5 markah]

**SOALAN TAMAT**



## FORMULA SHEET FOR ENGINEERING MATHEMATICS (DBM1013)

<p><b>QUADRATIC EQUATION</b></p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $\left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2 + c = 0$	<p><b>FORMULA OF TRIANGLE</b></p> <p><b>Sine Rules;</b> <math>\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}</math></p> <p><b>Cosine Rules;</b> <math>a^2 = b^2 + c^2 - 2bc \cos A</math></p> <p><i>Area of Triangle</i> <math>= \frac{1}{2}ab \sin C</math></p>
<p><b>MATRIX</b></p> <p>Co factor <math>C = (-1)^{(i+j)} M_{ij}</math></p> <p>Adjoin, <math>\text{Adj}(A) = C^T</math></p> <p>Inverse of Matrix, <math>A^{-1} = \frac{1}{ A } \text{Adj}(A)</math></p>	<p><b>COMPLEX NUMBER</b></p> <p>Modulus of <math>z = \sqrt{a^2 + b^2}</math></p> <p>Argument of <math>z = \tan^{-1} \left( \frac{b}{a} \right)</math></p> <p>Cartesian Form; <math>z = a + bi</math></p> <p>Polar Form; <math>z = r \angle \theta</math></p> <p>Exponential Form; <math>z = re^{i\theta}</math></p>
<p><b>TRIGONOMETRY</b></p> <p>Pythagoras' Theorem</p>  $c^2 = a^2 + b^2$	<p><b>VECTOR &amp; SCALAR</b></p> <p>Unit Vector, <math>\hat{u} = \frac{\underline{u}}{ \underline{u} }</math></p> <p><math>\vec{A} \bullet \vec{B} = a_1a_2 + b_1b_2 + c_1c_2</math></p> <p><math>\vec{A} \times \vec{B} = \begin{vmatrix} i &amp; j &amp; k \\ a_1 &amp; b_1 &amp; c_1 \\ a_2 &amp; b_2 &amp; c_2 \end{vmatrix}</math></p> <p><i>Area of parallelogram ABC</i> <math>=  \vec{AB} \times \vec{BC} </math></p>
<p><b>COMPOUND-ANGLE</b></p> $\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$ $\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$	<p><b>DOUBLE-ANGLE</b></p> $\sin 2A = 2 \sin A \cos A$ $\cos 2A = \cos^2 A - \sin^2 A$ $= 1 - 2 \sin^2 A$ $= 2 \cos^2 A - 1$ $\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$

