Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	:	MATHEMATICS 1
COURSE CODE	:	BBM 10303/BBP 10603
PROGRAMME CODE	:	BBA/BBB/BBD/BBE/BBF/BBG
EXAMINATION DATE	:	JUNE / JULY 2019
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

Q1

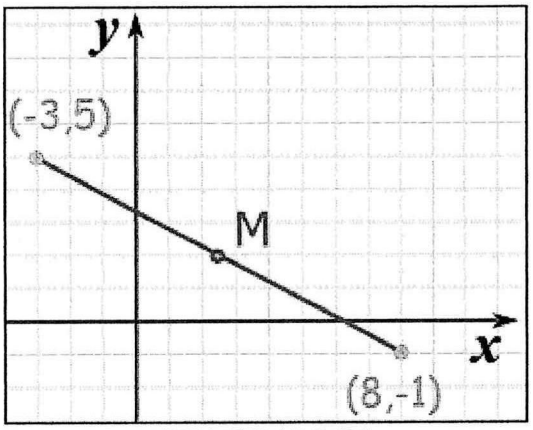

DIAGRAM Q1

(a) Find the midpoint of the straight line with endpoints (-3, 5) and (8, -1)

(4 marks)

(b) Find the length of the straight line in **DIAGRAM Q1**

(6 marks)

(c) Find the slope of the line in **DIAGRAM Q1**

(4 marks)

(d) Find the equation of the straight line in **DIAGRAM Q1**

(6 marks)

Q2 (a) Using the method of factorization, solve the following quadratic equations

$9x^2 - 5 = 12x - 5$

(4 marks)

(b) Sketch the graph of quadratic equation for $2x^2 + 4x + 2 = 0$

(6 marks)

(c) Solve the quadratic equation $x^2 - 12x = 28$

(4 marks)

(d) Sketch the graph of quadratic equation for $y = -x^2 - 2x + 8$

(6 marks)

Q3 (a) Solve each of the following inequalities $-3x+5 \leq -16$

(2 marks)

(b) Solve $-2x < 3(x-5)$ and graph the solution

(3 marks)

(c) Solve $|-3x-1| > 5$ and graph the solution

(4 marks)

(d) If $Q(-3,-4)$ be a point on the terminal side of an angle θ, find the value of the following without using calculator

(i) $\sin\theta = -\frac{4}{5}$

(ii) $\cos\theta = -\frac{3}{5}$

(iii) $\tan\theta = \frac{4}{3}$

(6 marks)

(e) Prove that $\frac{\tan(x)-1}{1-\cot(x)} = \tan(x)$

(5 marks)

Q4 (a) Express $\frac{2x+16}{x^2+x-6}$ in partial fractions

(5 marks)

(b) Express $\frac{5x+3}{x^2+x-2}$ in partial fractions

(5 marks)

(c) Find the inverse of the matrix $G = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$

(5 marks)

(d) Use Gaussian elimination method to solve the system of linear equations

$$3x + 4y + z = -6$$
$$2x - y + z = -5$$
$$x + 3y - z = 9$$

(5 marks)

Q5 (a) Convert the $z = -4 + 3i$ in the Euler form

(4 marks)

(b) Given $Z_1 = 5 - 3i$ and $Z_2 = 7 + 2i$, find

(i) $\frac{Z_1}{Z_2}$

(ii) $Z_1 Z_2$

(4 marks)

(c) If $\mathbf{u} = \mathbf{i} + 5\mathbf{j} - \mathbf{k}$ and $\mathbf{v} = \mathbf{i} + 7\mathbf{k}$, find

(i) $|\mathbf{u} + \mathbf{v}|$

(ii) $|\mathbf{u}| + |\mathbf{v}|$

(6 marks)

(d) Given $\mathbf{a} = -3\mathbf{i} + 3\mathbf{k}$, $\mathbf{b} = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$ and $\mathbf{c} = -3\mathbf{j} + 5\mathbf{k}$, find the value of

(i) $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c})$

(ii) $\hat{a}$

(6 marks)

-END OF QUESTIONS-

FINAL EXAMINATION

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$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$slope = \frac{y_2 - y_1}{x_2 - x_1}, x_2 \neq x_1$$

$$(\bar{x}, \bar{y}) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y - y_1 = m(x - x_1)$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$$

$$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$$

$$\tan^2\theta + 1 = \sec^2\theta$$

$$\cot^2\theta + 1 = \csc^2\theta$$

$$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$$

$$\sin 2\alpha = 2\sin\alpha\cos\alpha$$

$$\tan 2\alpha = \frac{2\tan\alpha}{1 - \tan^2\alpha}$$

$$AA^{-1} = A^{-1}A = I$$

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$$

$$A_{ij} = (-1)^{i+j} M_{ij}$$

$$x_1 = \frac{|D_{x1}|}{|D|}, x_2 = \frac{|D_{x2}|}{|D|}, x_3 = \frac{|D_{x3}|}{|D|}$$

$$r = \sqrt{x^2 + y^2}$$

$$\theta = tan^{-1}\left(\frac{y}{x}\right)$$

$$A^{-1} = \frac{1}{|A|}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$G^{-1} = \frac{1}{|G|}\begin{bmatrix} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} & \begin{vmatrix} a_{13} & a_{12} \\ a_{33} & a_{32} \end{vmatrix} & \begin{vmatrix} a_{12} & a_{13} \\ a_{22} & a_{23} \end{vmatrix} \\ \begin{vmatrix} a_{23} & a_{21} \\ a_{33} & a_{31} \end{vmatrix} & \begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix} & \begin{vmatrix} a_{13} & a_{11} \\ a_{23} & a_{21} \end{vmatrix} \\ \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix} & \begin{vmatrix} a_{12} & a_{11} \\ a_{32} & a_{31} \end{vmatrix} & \begin{vmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{vmatrix} \end{bmatrix}$$

$$i^2 = -1 \text{ or}$$
$$i = \sqrt{-1}$$

$$e^{i\theta} = \cos\theta + i\sin\theta$$

$$z^n = r^n[\cos(n\theta) + i\sin(n\theta)]$$

$$z^{\frac{1}{n}} = r^{\frac{1}{n}}\left[cos\left(\frac{\theta + 360°k}{n}\right) + isin\left(\frac{\theta + 360°k}{n}\right)\right]$$

$$|v| = \sqrt{v_1^2 + v_2^2 + v_3^2}$$

$$\cos\theta = \frac{a \cdot b}{|a||b|}$$

$$\hat{a} = \frac{a}{|a|}$$

$$z = r(cos\theta + i\sin\theta) = rcis\theta$$