



**FINAL EXAMINATION / PEPERIKSAAN AKHIR
SEMESTER I – SESSION 2020 / 2021
PROGRAM KERJASAMA**

COURSE CODE : DDWS 1013
KOD KURSUS

COURSE NAME : MATHEMATICS FOR COMPUTER SCIENCE
NAMA KURSUS : MATEMATIK UNTUK SAINS KOMPUTER

YEAR / PROGRAMME : 1 / DDWC / DDWZ
TAHUN / PROGRAM : 1/ DDWC / DDWZ

DURATION : 3 HOURS
TEMPOH : 3 JAM

DATE : NOVEMBER 2020
TARIKH

INSTRUCTION / ARAHAN:

1. Answer **ALL** (8) questions questions and write your answers on the answer sheet.
*Jawab **SEMUA** (8) soalan dan tulis jawapan anda pada kertas jawapan.*
2. A list of formula is given at the end of the question paper for reference.
Senarai rumus di sediakan di bahagian akhir kertas soalan sebagai rujukan.
1. Write your name, matric no., identity card no., course code, course name, section no. and lecturer's name on the first page (in the upper left corner) and every page thereafter on the answer sheet.
Tulis nama anda, no. matrik, no. kad pengenalan, kod kursus, nama kursus, no. seksyen dan nama pensyarah pada muka surat pertama (penjuru kiri atas) kertas jawapan dan pada setiap muka surat jawapan.
2. Each answer sheet must have a page number written at the bottom right corner.
Setiap helai kertas jawapan mesti ditulis nombor muka surat pada bahagian bawah penjuru kanan.
3. Answers should be handwritten, neat and clear.
Jawapan hendaklah ditulis tangan, kemas dan jelas menggunakan huruf cerai.

WARNING / AMARAN

Students caught copying / cheating during the examination will be liable for disciplinary actions and the faculty may recommend the student to be expelled from sitting for exam.
Pelajar yang ditangkap meniru / menipu semasa peperiksaan akan dikenakan tindakan disiplin dan pihak fakulti boleh mengesyorkan pelajar diusir dari menduduki peperiksaan.

This examination paper consists of **7** pages including the cover.
*Kertas soalan ini mengandungi **7** muka surat termasuk kulit hadapan.*

ONLINE EXAMINATION RULES AND REGULATIONS
PERATURAN PEPERIKSAAN SECARA DALAM TALIAN

1. Student must carefully listen and follow instructions provided by invigilator.
Pelajar mesti mendengar dan mengikuti arahan yang diberikan oleh pengawas peperiksaan dengan teliti.
2. Student is allowed to start examination only after confirmation of invigilator if all needed conditions are implemented.
Pelajar dibenarkan memulakan peperiksaan hanya setelah pengesahan pengawas peperiksaan sekiranya semua syarat yang diperlukan telah dilaksanakan.
3. During all examination session student has to ensure, that he is alone in the room.
Semasa semua sesi peperiksaan pelajar harus memastikan bahawa dia bersendirian di dalam bilik.
4. During all examination session student is not allowed to use any other devices, applications except other sites permitted by course lecturer.
Sepanjang sesi peperiksaan pelajar tidak dibenarkan menggunakan peranti dan aplikasi lain kecuali yang dibenarkan oleh pensyarah kursus.
5. After completing the exam student must inform invigilator via the set communication platform (eg. WhatsApp etc.) about completion of exam and after invigilator's confirmation leave examination session.
Selepas peperiksaan selesai, pelajar mesti memaklumkan kepada pengawas peperiksaan melalui platform komunikasi yang ditetapkan (contoh: Whatsapp dan lain-lain) mengenai peperiksaan yang telah selesai dan meninggalkan sesi peperiksaan selepas mendapat pengesahan daripada pengawas peperiksaan.
6. Any technical issues in submitting answers online have to be informed to respective lecturer within the given 30 minutes. Request for re-examination or appeal will not be entertain if complains are not made by students to their lecturers within the given 30 minutes.
Sebarang masalah teknikal dalam menghantar jawapan secara dalam talian perlu dimaklumkan kepada pensyarah masing-masing dalam masa 30 minit yang diberikan. Permintaan untuk pemeriksaan semula atau rayuan tidak akan dilayan sekiranya aduan tidak dibuat oleh pelajar kepada pensyarah mereka dalam masa 30 minit yang diberikan.
7. During online examination, the integrity and honesty of the student is also tested. At any circumstances student is not allowed to cheat during examination session. If any kind of cheating behaviour is observed, UTM have a right to follow related terms and provisions stated in the respective Academic Regulations and apply needed measures.
Semasa peperiksaan dalam talian, integriti dan kejujuran pelajar juga diuji. Walau apa pun keadaan pelajar tidak dibenarkan menipu semasa sesi peperiksaan. Sekiranya terdapat sebarang salah laku, UTM berhak untuk mengikuti terma yang dinyatakan dalam Peraturan Akademik.

1. (a) **Copy and shade the area represented by the sets in the Venn diagram 1 and 2 below.**
Salin dan lorekkan kawasan yang di wakili oleh set kepada rajah Venn 1 dan 2 berikut.

(i) $P \cup (Q \cap R)$

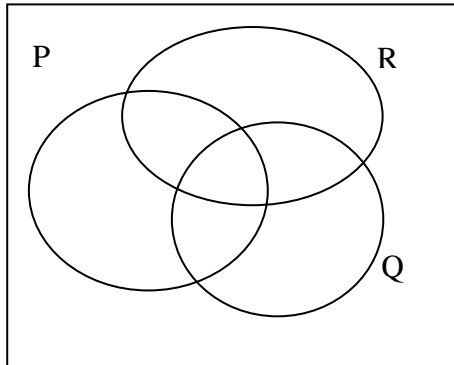


Diagram 1/Rajah 1

(ii) $(A \cap B)'$

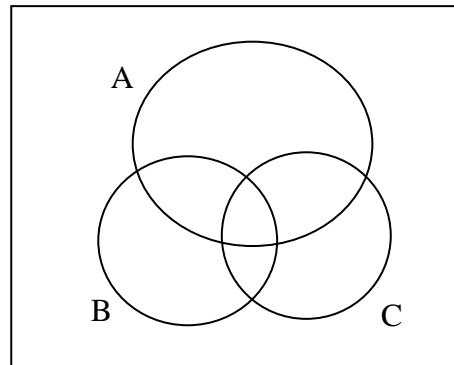


Diagram 2/Rajah 2

- (b) **Each classroom in a group of 160 students owns at least one of the following mobile phones, Aphone, Sams and Appo. 4 students have all types of mobile phones. 85 students have only Aphone. 70 students have only Sams. 83 students have only Appo. 35 students have both Aphone and Sams, 32 students have both Aphone and Appo and 15 students have both Sams and Appo.**

Draw a Venn diagram to illustrate this information.

Setiap kelas dalam satu kumpulan 160 pelajar mempunyai sekurang-kurangnya satu daripada telefon bimbit berikut: Aphone, Sams dan Appo. 4 pelajar mempunyai ketiga-tiga jenis telefon bimbit. 85 pelajar mempunyai cuma Aphone. 70 pelajar mempunyai cuma Sams. 83 pelajar mempunyai cuma Appo. 35 pelajar mempunyai Aphone dan Sams, 32 pelajar mempunyai Aphone dan Appo dan 15 pelajar mempunyai Sams dan Appo.

Lakarkan gambarajah Venn untuk menunjukkan data ini.

- (i) **How many students own only Appo?**

Berapa pelajar memiliki cuma Appo?

- (ii) **How many students own Aphone or Appo?**

Berapa pelajar memiliki Aphone atau Appo?

(6 M)

2. (a) Find the value of $\frac{3333.789 \times 10^2}{(77.899)(5.926)}$ to 3 significant values and state the answer by using the scientific notation.

Dapatkan nilai $\frac{3333.789 \times 10^2}{(77.899)(5.926)}$ sehingga 3 angka bernilai dan nyatakan jawapan menggunakan tatacara saintifik.

- (b) Convert each of the following number:

Tukarkan setiap nombor yang berikut:

- (i) 3838 into a hexadecimal number system.

3838 kepada sistem nombor asas enam belas.

- (i) AEF_{16} into an octal number system.

AEF_{16} kepada sistem nombor asas lapan.

- (c) Solve the following arithmetic operation:

Selesaikan operasi aritmetik berikut:

$$10101_2 + 1011_2$$

(6 M)

3. (a) Given $f: x \rightarrow 7 - 2x^2$, and $g: x \rightarrow 3\sqrt{x-6}$.

Diberi $f: x \rightarrow 7 - 2x^2$, dan $g: x \rightarrow 3\sqrt{x-6}$.

- (i) Find the function of $(f \circ g)(x)$ and $(g \circ f)(x)$,

Dapatkan fungsi $(f \circ g)(x)$ dan $(g \circ f)(x)$,

- (ii) Find the value of $(f \circ g)(x) = 8$.

Dapatkan nilai $(f \circ g)(x) = 8$.

- (iii) Find $g^{-1}(x)$ and state its domain.

Dapatkan $g^{-1}(x)$ dan nyatakan domainnya

- (b) Given $P(x) = 3x^3 + ax^2 + bx + 3$ has remainder 0 when divided by $(x - 1)$ and has remainder 10 when divided by $(x - 2)$. Find the values of a and b thus find the remainder when the function is divided by $(x - 4)$.

Diberi $P(x) = 3x^3 + ax^2 + bx + 3$ mempunyai baki 0 apabila dibahagi dengan $(x - 1)$ dan mempunyai baki 10 apabila dibahagi dengan $(x - 2)$. Dapatkan nilai a dan b , seterusnya hitungkan baki apabila ungkapan ini dibahagi dengan $(x - 4)$.

(7 M)

4. (a) **By using the method of completing the square, rewrite the quadratic function $f(x) = -x^2 + 6x - 18$ in the form of $a(x-h)^2 + k$. Find the maximum or minimum point and sketch the graph of the function.**

Dengan menggunakan kaedah melengkapkan kuasa dua, tuliskan fungsi kuadratik $f(x) = -x^2 + 6x - 18$ dalam bentuk $a(x-h)^2 + k$. Dapatkan titik maksimum atau minimum dan lakarkan graf fungsi tersebut.

- (b) **The roots of the quadratic equation $18x^2 - 12x + 9 = 0$ are α and β . Form a new equation whose roots are $(\alpha + \beta)$ and $(\beta + \alpha)$.**

Punca-punca persamaan kuadratik $18x^2 - 12x + 9 = 0$ ialah α dan β . Bentukkan persamaan baru dengan punca-punca $(\alpha + \beta)$ dan $(\beta + \alpha)$. (6 M)

5. (a) **Find the value of**

Dapatkan nilai bagi

$$(i) \begin{pmatrix} 5 & -20 \\ 4 & 6 \\ 2 & 3 \end{pmatrix} + 4 \begin{pmatrix} 4 & 0 \\ 5 & 9 \\ 2 & 1 \end{pmatrix} \qquad (ii) \begin{pmatrix} 2 & -1 \\ -2 & 5 \\ 3 & 3 \end{pmatrix} \begin{pmatrix} 8 & 4 \\ 6 & -2 \end{pmatrix}$$

- (b) **Find all the values of x, y and z in this linear equation by using the Cramer’s rule.**

Dapatkan kesemua nilai x, y dan z dalam persamaan linear berikut dengan menggunakan Petua Cramer.

$$x + 2y - 2z = 8$$

$$x + 2y + 2z = 22$$

$$x + 3y - 3z = 6$$

(7 M)

6. **Given the following vectors:**

Diberi vektor-vektor berikut:

If $\vec{u} = \begin{bmatrix} 6 \\ 37 \\ 37 \end{bmatrix}$, $\vec{u}_1 = \begin{bmatrix} 2 \\ 6 \\ 5 \end{bmatrix}$, $\vec{u}_2 = \begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}$, and/dan $\vec{u}_3 = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$ then/maka

- (a) **Express \vec{u} as a linear combination of \vec{u}_1 , \vec{u}_2 and \vec{u}_3 .**

Nyatakan \vec{u} sebagai kombinasi linear kepada \vec{u}_1 , \vec{u}_2 dan \vec{u}_3 .

- (b) **Find $\vec{u}_2 \times \vec{u}_3$**

Dapatkan $\vec{u}_2 \times \vec{u}_3$

- (c) **Find the angle between the vectors \vec{u}_1 and \vec{u}_3 .**

Dapatkan sudut di antara vektor \vec{u}_1 dan \vec{u}_3 .

(6 M)

7. (a) Find $\frac{dy}{dx}$ if:

Dapatkan $\frac{dy}{dx}$ jika :

(i) $y = 4x^6 - 6x^3 + \frac{2}{x^2}$ (ii) $y = (5x^4 - 2)\left(8x + \frac{3}{x^2}\right)$

(b) Find the equation of the tangent and normal for the following curve.

Dapatkan persamaan garis tangen dan normal kepada lengkungan berikut.

$y = x^2 - 5x + 2$; at (pada) (0,2) . (6 M)

8. (a) Evaluate the following integrals:

Nilaikan kamiran berikut:

(i) $\int \frac{(6x-2)^5}{12} dx$ (ii) $\int_0^4 6\sqrt{x} + 4x^2 - 7 dx$

(b) Find the area of the region bounded by the curve and line in Diagram 3.

Dapatkan luas rantau yang di batasi oleh lengkungan dan garis dalam Rajah 3.

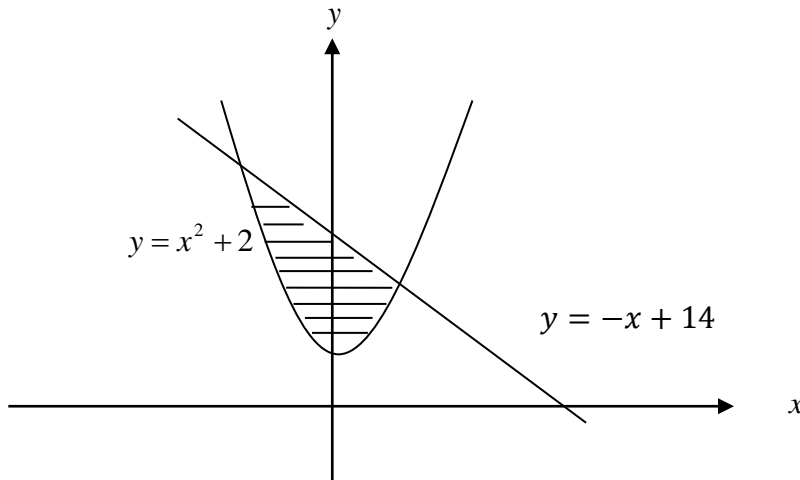


Diagram 3/ Rajah 3

(6 M)

END OF QUESTION PAPERS/ KERTAS SOALAN TAMAT

APPENDIX

Solving Linear and Quadratic Equations

If $ax^2 + bx + c = 0$, then the roots are: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (Quadratic Formula)

If $ax^2 + bx + c = 0$, then the sum of roots is $\alpha + \beta = -\frac{b}{a}$ and the product of roots is $\alpha\beta = \frac{c}{a}$

Quadratic Equation: $x^2 - (S.O.R)x + (P.O.R) = 0$

$$a^2 - b^2 = (a + b)(a - b)$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

Matrices and System of Linear Equations

$$A^{-1} = \frac{1}{|A|} adjA \qquad x_i = \frac{|A_i|}{|A|} \qquad x = A^{-1}b$$

Vectors

If $\vec{u} = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$ and $\vec{v} = \begin{bmatrix} v_1 \\ v_2 \\ v_3 \end{bmatrix}$, and θ is the angle between \vec{u} and \vec{v}

Scalar Product $\vec{u} \bullet \vec{v} = u_1v_1 + u_2v_2 + u_3v_3$ Cross Product $\vec{u} \times \vec{v} = \begin{bmatrix} u_2v_3 - u_3v_2 \\ u_3v_1 - u_1v_3 \\ u_1v_2 - u_2v_1 \end{bmatrix}$

Length: $\|\vec{v}\| = \sqrt{v_1^2 + v_2^2 + \dots + v_n^2}$ $\cos \theta = \frac{\vec{u} \bullet \vec{v}}{\|\vec{u}\| \|\vec{v}\|}$

Tangent Line: $y - y_0 = f'(x_0)(x - x_0)$ Normal Line: $y - y_0 = -\frac{1}{f'(x_0)}(x - x_0)$

Differentiation Formula

$$\frac{d}{dx}(x^n) = nx^{n-1}$$

$$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

Integration Formula

$$\int x^n dx = \frac{x^{n+1}}{n+1} + c ; (n \neq -1)$$

$$\int (ax+b)^n dx = \frac{1}{a} \frac{(ax+b)^{n+1}}{n+1} + c ; (n \neq -1)$$

$$Area = \int_a^b [f(x) - g(x)] dx$$

$$Volume = \pi \int_a^b [f(x)]^2 dx$$