

UNIVERSITI MALAYA
UNIVERSITY OF MALAYA

PEPERIKSAAN IJAZAH SARJANA MUDA SAINS KOMPUTER / SARJANA MUDA
TEKNOLOGI MAKLUMAT
EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE / BACHELOR
OF INFORMATION TECHNOLOGY

SESI AKADEMIK 2018/2019 : SEMESTER I
ACADEMIC SESSION 2018/2019 : SEMESTER I

WIX1002 : Asas-Asas Pengaturcaraan
Fundamentals of Programming

Jan 2019
Jan 2019

Masa: 3 jam 30 minit
Time: 3 hours 30 minutes

ARAHAN KEPADA CALON :
INSTRUCTIONS TO CANDIDATES:

Calon dikehendaki menjawab **SEMUA** soalan (50 markah).
Answer **ALL** questions (50 marks).

(Kertas soalan ini mengandungi 5 soalan dalam 8 halaman yang dicetak)
(This question paper consists of 5 questions on 8 printed pages)

1. Aturcara dalam fail **Q1.java** mengandungi banyak ralat. Betulkan kesemua ralat tersebut. (Salin fail **Q1.java** dari direktori akaun peperiksaan anda. Selepas aturcara dibetulkan, namakan fail tersebut sebagai **[matricNumberQ1.java]**; contoh: **WIA180000Q1.java** dan salin fail ini ke direktori akaun peperiksaan.)

The program in the Q1.java file contains many errors. Correct all errors. (Copy the Q1.java file from your exam account directory. After the program has been corrected, name the file as [matricNumberQ1.java; example: WIA180000Q1.java] and copy this file to your exam account directory.)

```
import java.util.Random;
// Filename: Q1.java
public class Q1 {
    public static void main(String[] args) {
        System.out.println("This program shows the number of odd and even number from 10
random numbers. The random numbers must be from 0 - 100");
        int num, odd=0, even=0;
        Random r = new Scanner();
        for (int i=1, i<=5; i--) {
            num = r.nextInt();
            System.out.print(num + " ");
            if (isEven(num)) {
                ++odd;
            }
            else {
                ++even;
            }
        }
        System.out.println("\nNumber of odd number: " + odd);
        System.out.println("Number of even number: " , even);
    }
    public boolean isEven(double a) {
        if (a/2==1)
            return true;
        else
            return false;
    }
}
```

(5 markah/marks)

2. Matriks adalah tatasusunan segi empat yang disusun dalam baris dan lajur. Tulis satu aturcara untuk menghasilkan DUA matriks $N \times N$. Aturcara ini mestilah terdiri daripada empat kaedah berikut. Formula diberikan seperti di gambarajah 1.
- Satu kaedah untuk menghasilkan matriks, nilai matriks adalah nombor rawak dari 0 - 9.
 - Satu kaedah untuk memaparkan matriks.
 - Satu kaedah untuk menambah dua matriks.
 - Satu kaedah untuk hasil darab dua matriks.

A matrix is a rectangular array of numbers arranged in rows and columns. Write a program to generate TWO $N \times N$ matrix. The program must consist of the following four methods. The formula is given as below in Figure 1.

- A method to generate the matrix, the values of the matrix is any random number from 0 - 9.
- A method to display the matrix.
- A method to add two matrices.
- A method to multiply two matrices.

$$\begin{bmatrix} a_1 & b_1 \\ c_1 & d_1 \end{bmatrix} + \begin{bmatrix} a_2 & b_2 \\ c_2 & d_2 \end{bmatrix} = \begin{bmatrix} a_1 + a_2 & b_1 + b_2 \\ c_1 + c_2 & d_1 + d_2 \end{bmatrix}$$

$$\begin{pmatrix} A & B \\ C & D \end{pmatrix} \times \begin{pmatrix} E & F \\ G & H \end{pmatrix} = \begin{pmatrix} AE+BG & AF+BH \\ CE+DG & CF+DH \end{pmatrix}$$

Figure 1: Matrix Formula

(Simpan aturcara tersebut dalam fail **Main.java**. Salin fail ini ke direktori akaun peperiksaan anda dan namakan semula sebagai [**matricNumberQ2.java**; contoh: **WIA180000Q2.java**]).

(Save the program in the **Main.java** file. Copy this file to your exam account directory and rename as [**matricNumberQ2.java**; example: **WIA180000Q2.java**]).

Contoh output:
Sample output:

Enter N : 2	Enter N : 3
Matrix A	Matrix A
9 0	9 6 4
2 8	9 4 5
Matrix B	1 7 1
3 4	Matrix B
9 9	5 5 6
Matrix A + B	1 9 2
12 4	4 6 6
11 17	Matrix A + B
Matrix A X B	14 11 10
27 36	10 13 7
78 80	5 13 7
	Matrix A X B
	67 123 90
	69 111 92
	16 74 26

(10 markah/marks)

3. Ahli biologi menggunakan turutan huruf A, C, T dan G untuk mewakili model genom. Gen adalah substring genom yang bermula selepas **ATG triplet** dan berakhir sebelum **triplet TAG, TAA** atau **TGA**. Selain itu, panjang gen adalah dalam gandaan 3 dan gen tidak mengandungi sebarang **triplet ATG, TAG, TAA** dan **TGA**. Tulis satu aturcara yang meminta pengguna memasukkan genom dan memaparkan semua gen dalam genom tersebut. (Simpan aturcara tersebut dalam fail **Main.java**. Salin fail ini ke direktori akaun peperiksaan anda dan namakan semula sebagai **[matricNumberQ3.java]**; contoh: **WIA180000Q3.java**).

*Biologist uses a sequence of letters A, C, T and G to model a genome. A gene is a substring of a genome that starts after a triplet **ATG** and ends before a triplet of **TAG, TAA** or **TGA**. Furthermore, the length of a gene string is a multiple of 3 and the gene does not contain any of the triplets **ATG, TAG, TAA** and **TGA**. Write a program that asks the user to enter a genome and displays all genes in the genome. (Save the program in the **Main.java** file. Copy this file to your exam account directory and rename as **[matricNumberQ3.java]**; example: **WIA180000Q3.java**).*

Contoh output:

Sample output:

```
Enter genome string [quit to stop] : TTATGTTTTAAGGATGGGGCGITAGTT
TTT
GGGCGT
Enter genome string [quit to stop] : GGTATGATGGGTGA
GGT
Enter genome string [quit to stop] : ATGTGA
No gene is found
Enter genome string [quit to stop] : ATGTTTGTA
No gene is found
Enter genome string [quit to stop] : TGGATGTATATA
No gene is found
Enter genome string [quit to stop] : quit
```

(10 markah/marks)

4. Ahmad menulis satu karangan ringkas mengenai cita-cita saya dan menyimpan karangan tersebut dalam fail teks bernama **myAmbition.txt**. Tuliskan satu aturcara untuk Ahmad untuk mengira dan mencetak bilangan ayat, perkataan dan frekuensi huruf dalam karangan tersebut. Satu ayat ditamatkan dengan noktah dalam karangan tersebut. (Simpan aturcara tersebut dalam fail **Main.java**. Salin fail ini ke direktori akaun peperiksaan anda dan namakan semula sebagai **[matricNumberQ4.java]**; contoh: **WIA180000Q4.java**).

*Ahmad wrote a simple essay about My Ambition and save it in a text file name **myAmbition.txt**. Write a program for Ahmad to count and print the number of sentences, words and letter frequencies in the essay. A sentence is terminated with a full stop in the essay. (Save the program in the **Main.java** file. Copy this file to your exam account directory and rename as **[matricNumberQ4.java]**; example: **WIA180000Q4.java**).*

Contoh output:

Sample output:

The essay is :

Living in the modern world, a person really needs to know what he wants to do. In order to lead a meaningful and colorful life, everyone needs an ambition. If one does not have an ambition, he will be like a ship sailing on the wide sea blindly. That is why I have made up my mind to become a reporter since my childhood.

Number of sentences : 4

Number of words : 64

A : 20 B : 5 C : 4 D : 15 E : 32 F : 4 G : 3 H : 12
I : 23 J : 0 K : 2 L : 16 M : 9 N : 24 O : 23 P : 4
Q : 0 R : 11 S : 10 T : 14 U : 3 V : 4 W : 7 X : 0
Y : 6 Z : 0

(10 markah/marks)

5. Perkhidmatan penghantaran pakej menawarkan beberapa pilihan penghantaran yang berbeza, masing-masing dengan kos tertentu. Tulis satu aturcara untuk mewakili pakej penghantaran. Reka bentuk satu kelas **Delivery** yang terdiri daripada ahli berikut:

- Satu medan untuk penghantar.
- Satu medan untuk penerima.
- Satu medan untuk berat pakej dalam kilogram.
- Satu pembina yang mengandungi penghantar, penerima dan berat pakej dalam kilogram.
- Satu kaedah **totalCost** yang memulangkan jumlah kos penghantaran berdasarkan Jadual 1 di bawah. Kos satu pakej 7 kilogram ialah RM24.40 ($RM2.80 \times 5 + RM5.20 \times 2$).
- Satu kaedah **toString** yang memulangkan penghantar, penerima, berat pakej dalam kilogram dan jumlah kos penghantaran.

*Package delivery services offer a number of different shipping options, each with specific costs associated. Write a program to represent the delivery packages. Design a **Delivery** class that consists of the following members:*

- A field for the sender.
- A field for the recipient.
- A field for the weight of package in kilogram.
- A constructor that contains the sender, recipient and weight of package in kilogram.
- A **totalCost** method that returns the total shipping cost based on the Table 1 below. A 7 kilogram package cost RM24.40 ($RM2.80 \times 5 + RM5.20 \times 2$).
- A **toString** method that returns the sender, recipient, the weight of package in kilogram and total shipping cost.

Table 1: Delivery Cost

Weight of package in kilogram	Cost per kilogram (RM)
Less than or equal to 5	2.80
Greater than 5 and less than or equal to 20	5.20
Greater than 20 and less than or equal to 50	7.00
Greater than 50	8.60

(7 markah/marks)

Reka bentuk satu kelas **SpecialDelivery** yang mewarisi kelas **Delivery**. Kelas **SpecialDelivery** mempunyai ahli berikut:

- Satu medan untuk penghantaran hujung minggu. Nilai medan ialah sama ada benar atau palsu.
- Satu medan untuk penghantaran malam. Nilai medan ialah sama ada benar atau palsu.
- Satu pembina.

- Satu kaedah **totalCost** yang memulangkan jumlah kos penghantaran. Kos penghantaran adalah sama dengan penghantaran biasa, dengan bayaran tambahan sebanyak RM50 untuk penghantaran hujung minggu. Selain itu, tambahan 20% daripada jumlah kos penghantaran jika pakej dihantar pada waktu malam.
- Satu kaedah **toString** yang memulangkan penghantaran hujung minggu dan penghantaran waktu malam.

Design a **SpecialDelivery** class that extends the **Delivery** class. The **SpecialDelivery** class has the following members:

- A field for the weekend delivery. The value is either true or false.
- A field for the nighttime delivery. The value is either true or false.
- A constructor.
- A **totalCost** method that returns the total shipping cost. The shipping cost is similar to normal delivery, with extra charges of RM50 for weekend delivery. Besides, an extra 20% of the total shipping cost if the package is delivered at night.
- A **toString** method that returns the weekend and nighttime delivery.

(5 markah/marks)

Mutu merancang untuk menghantar pakej berikut dalam Jadual 2. Tulis satu kelas tester yang membina objek-objek yang sesuai dan kemudian tentukan jumlah kos penghantaran untuk setiap pakej yang dihantar dan jumlah keseluruhan kos penghantaran.

Mutu is planning to deliver the following package in Table 2. Write a tester class that create the suitable objects and then determine the total shipping cost for each package delivered and the grand total of shipping cost.

Table 2: Package Delivery

Sender	Recipient	weight of package in kilogram	Weekend Delivery	Night Time Delivery
Ali	Ahmad	4.4	No	No
Ah Chong	Fatimah	63.1	No	No
FSKTM, UM	FK, UM	32.5	Yes	No
Ang	Liew	19.0	Yes	Yes

(Salin fail **Delivery.java**, **SpecialDelivery.java** dan **Main.java** ke dalam direktori akaun peperiksaan anda. Namakan **Delivery.java** sebagai [matricNumberDelivery.java; contoh: **WIA180000Delivery.java**], **SpecialDelivery.java** sebagai [matricNumberSpecialDelivery.java; contoh: **WIA180000SpecialDelivery.java**] dan **Main.java** sebagai [matricNumberQ5.java; contoh: **WIA180000Q5.java**]).

(Copy the *Delivery.java*, *SpecialDelivery.java* and *Main.java* files to your exam account directory. Rename the *Delivery.java* as [matricNumberDelivery.java; example: *WIA180000Delivery.java*], *SpecialDelivery.java* as [matricNumberSpecialDelivery.java; example: *WIA180000SpecialDelivery.java*] and *Main.java* as [matricNumberQ5.java; example: *WIA180000Q5.java*]).

Contoh output:

Sample output:

From : Ali To: Ahmad

Weight of Package : 4.4 kg

Shipping Cost : RM12.32

From : Ah Chong To: Fatimah

Weight of Package : 63.1 kg

Shipping Cost : RM414.66

From : FSKTM, UM To: FK, UM

Weight of Package : 32.5 kg

Shipping Cost : RM229.5

Weekend Delivery

From : Ang To: Liew

Weight of Package : 19.0 kg

Shipping Cost : RM164.16

Weekend Delivery

Night Time Delivery

The total shipping cost is RM 820.64

(3 markah/marks)

TAMAT
END