
FIRST SEMESTER, 2003
Campus: City

COMPUTER SCIENCE**Introduction to Computing and Applications****(Time allowed: TWO hours)**

NOTE: Attempt **ALL** questions.
Write your answers in the space provided.
There is space at the back for answers that overflow the allotted space

Surname	
Forenames	
Student ID	
Login (UPI)	

Section	Marks	Out of
SECTION A: Java		50
SECTION B: Binary Numbers		5
SECTION C: HTML		10
SECTION D: Database and Spreadsheets		15
SECTION E: Graphics		10
SECTION F: AI		5
SECTION G: Alice		5
Total		100

CONTINUED

SECTION A**Java [50 Marks]**

1. Give one good reason why we should use variables in our programs.

To make the easier to read / debug / modify / run with alternative data.

(1 Mark)

2. Write a Java statement to initialize a variable called `state` to "happy".

```
state = "happy";
```

(1 Mark)

3. Write a Java statement that divides 9 by 5 and puts the result into an integer variable called `answer`.

```
Answer = 9 / 5;
```

(1 Mark)

4. Write a Java statement that draws a square with the top left-hand corner at the point (30,50). Each side should be 40 pixels long. Do NOT use variables here.

```
g.drawRect(30, 50, 40, 40);
```

(1 Mark)

5. Write a Java statement that assigns the y coordinate of a mouse-click position to a variable called `firstTop`.

```
firstTop = Mouse.getY();
```

(1 Mark)

6. In no more than two sentences give one advantage and one disadvantage of using the Java Console window.

Do not have to give co-ordinates
Cannot use graphics

(2 Marks)

CONTINUED

7. Below is a program segment and a Java Console window. Write the output of the program segment in the Java Console window.

```
// * * * * *
// Draws a pattern

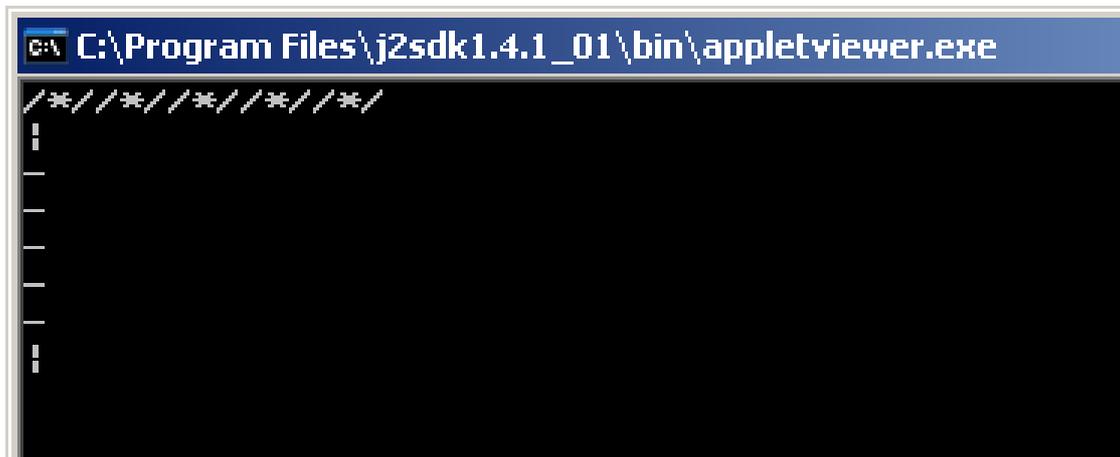
int size;
int counter;

size = 3;
counter = 0;
do {
    System.out.print("/*/");
    counter = counter + 1;
} while (counter != size + 2);
System.out.println();

System.out.println("|");
do {
    System.out.println("-");
    counter = counter - 1;
} while (counter != 0);

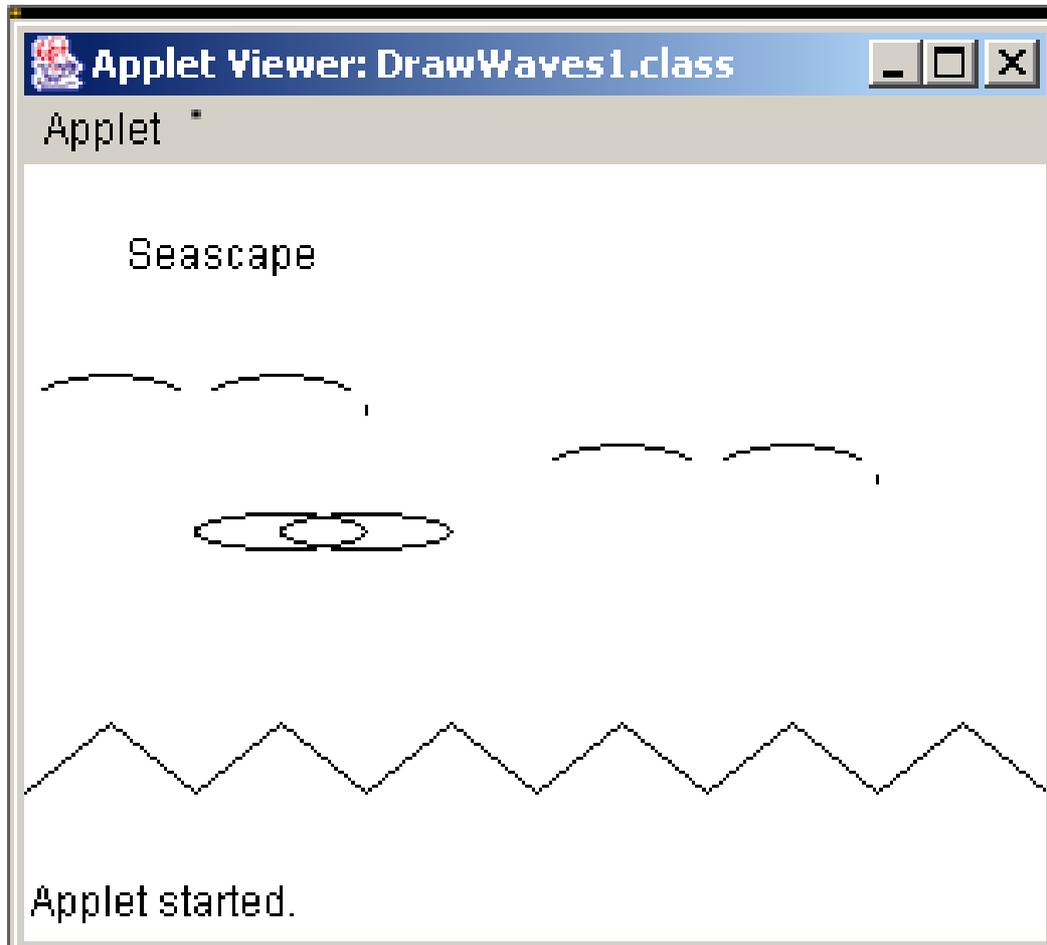
System.out.println("|");

// * * * * *
```



(6 marks)

CONTINUED



(12 Marks)

9. Below is a program segment and a Java Console window. Write the output of the program segment in the Java Console window.

IMPORTANT NOTE: the data items entered at the keyboard are: 4, 5, 2, and 1.

Show blank lines by ~~~.

```
// * * * * *
// Scoreboard
final int POINTS_PER_STRIKE = 10;
final String MATCH = "GALAXY CUP";

int alphas, earthlings;
int totalAlphas, totalEarthlings;
int time;

time = 60;
totalAlphas = 0;
totalEarthlings = 0;

System.out.println(MATCH);
System.out.println();
System.out.println("LASER STRIKES");
System.out.println();

do {
    System.out.println("Enter number of strikes for Alphas
and Earthlings: ");
    alphas = Keyboard.readInt();
    earthlings = Keyboard.readInt();
    totalAlphas = totalAlphas + alphas *
POINTS_PER_STRIKE;
    totalEarthlings = totalEarthlings + earthlings *
POINTS_PER_STRIKE;

    System.out.println("Alphas: " + totalAlphas);
    System.out.println("Earthlings: " + totalEarthlings);

    time = time - 30;
    System.out.println("TIME REMAINING: " + time);
    System.out.println("***");
    System.out.println();
} while (time > 0);

if (totalAlphas > totalEarthlings)
    System.out.println("Alphas win");
else if (totalAlphas < totalEarthlings)
    System.out.println("Earthlings win");
else
    System.out.println("A draw");
// * * * * *
```

```
C:\Program Files\j2sdk1.4.1_01\bin\appletviewer.exe
GALAXY CUP
LASER STRIKES
Enter number of strikes for Alphas and Earthlings:
4
5
Alphas: 40
Earthlings: 50
TIME REMAINING: 30
***
Enter number of strikes for Alphas and Earthlings:
2
1
Alphas: 60
Earthlings: 60
TIME REMAINING: 0
***
A draw
-
```

(10 marks)

CONTINUED

10. Below are two Applet windows followed by the start of a program segment. Complete the program segment so that:

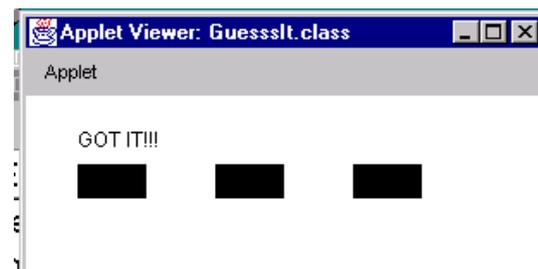
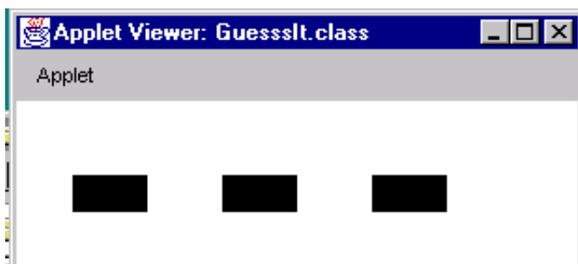
- (i) Initially only three black rectangles appear on the screen as shown in the left hand screen shot below.
- (ii) The program generates a random number using: `(int) (3 * Math.random() + 1)` (This is done for you).
- (iii) If the user clicks inside the lefthand rectangle and the generated random number is 1 the program displays GOT IT!!! as shown in the right hand screen shot. Similarly if the user clicks in the middle rectangle and the generated random number is 2, or the user clicks in the rightmost rectangle and the generated random number is 3, the program displays GOT IT!!! Otherwise no message is displayed.

NOTES:

You must use the variables given at the beginning of the program and use the method indicated by the comment lines.

No shortcuts are allowed!

The position of GOT IT!!! is at (30, 30) in all three cases.



```
int left, leftMost, width, height, top, boxNumber;
int thisOne;
int x, y;
int randomNbr;
```

```
leftMost = 30;
left = leftMost;
width = 40;
height = 20;
top = 40;
```

```
thisOne = 9;
boxNumber = 1;
```

```
// Draw the three rectangles using one loop
// Start the loop here
```

```
do {
```

```
// Fill a rectangle and increment left & boxNumber
```

```
g.fillRect(left, top, width, height);  
left = left + 2 * width;  
boxNumber = boxNumber + 1;
```

```
// Loop until condition
```

```
} while (boxNumber <= 3);
```

```
// Get a random number between 1 and 3 inclusive
```

```
randomNbr = (int) (3 * Math.random() + 1);
```

```
// Get the mouse X coordinate and assign in to x
```

```
x = Mouse.getX();
```

```
// Get the mouse Y coordinate and assign in to y
```

```
y = Mouse.getY();
```

```
// Assign 1, or 2, or 3 to thisOne depending on which rectangle was clicked in.
```

```
if (x > leftMost && x < (leftMost + width) && y > top && y < (top + height))  
    thisOne = 1;  
    else if (x > (leftMost + 2 * width) && x < (leftMost + 3 * width) && y > top  
&& y < (top + height))  
        thisOne = 2;  
        else if (x > (leftMost + 4 * width) && x < (leftMost + 5 * width) && y > top  
&& y < (top + height))  
            thisOne = 3;
```

```
// Display "GOT IT!!!" in the Applet window only if thisOne is equal to randomNbr.
```

```
if (thisOne == randomNbr)  
    g.drawString("GOT IT!!!", 30,30);
```

(15 marks)

CONTINUED

SECTION B**Binary Numbers [5 marks]**

11. Convert the following number from binary to decimal: (show your working)

01101111

$$64 + 32 + 8 + 4 + 2 + 1 \\ = 111$$

(3 marks)

12. Complete the following binary numbers: (show your working)

$$\begin{array}{r} 11011111 \\ + 11100110 \\ \hline 111000101 \end{array}$$

$$\begin{array}{r} 11010011 \\ - 01010110 \\ \hline 1111101 \end{array}$$

(2 marks)

SECTION C**HTML [10 marks]**

13. Draw the Table that the following html code describes.

```
<HTML><BODY>
  <table border="1">
    <tr>
      <TD><STRONG>Movie</Strong></TD>
      <TD>Year</TD>
      <TD>Actor</TD>
    </tr>
    <tr>
      <TD>The Matrix Reloaded</TD>
      <TD>Keanu Reeves</TD>
      <TD>2003</TD>
    </tr>
    <tr>
      <TD>X-Men 2</TD>
      <TD>Patrick Stewart</TD>
      <TD>2003</TD>
    </tr>
  </table>
</BODY></HTML>
```

Movie	Year	Actor
The Matrix Reloaded	Keanu Reeves	2003
X-Men 2	Patrick Stewart	2003

1 mark for border
1 mark for emphasis on Movie cell
8 marksw for correct table layout

(10 marks)

CONTINUED

SECTION D**Database and Spreadsheets [15 marks]**

14. You are given the following table called **movies** in an Access database:

Title	Director	Actor
The Majestic	Frank Darabont	Jim Carrey
X-Men 2	Bryan Singer	Patrick Stewart
Me, Myself & Irene	Bobby Farrelly	Jim Carrey
Gosford Park	Robert Altman	Kristin Thomas
The Truman Show	Peter Weir	Jim Carrey

And the following SQL statement:

SELECT Title, Director from movies where Actor='Jim Carrey' order by Title;

Show the output of this query:

Me, Myself & Irene, Bobby Farrelly
 The Majestic Frank, Darabont
 The Truman Show, Peter Weir

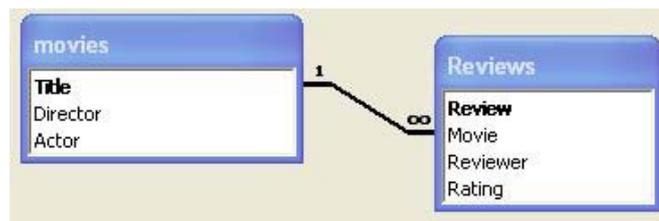
1 mark for correct fields selected (title and director)

1 mark for ordering

1 mark for correct values

(3 marks)

Assume this information is found under *Relationships*, in Access.



15. State the primary key for each table.

Movies: Title 1 mark

Reviews: Review 1 mark

(2 marks)

CONTINUED

16. What is the relationship between these two tables? What fields are related in the two tables? State the primary key, foreign key relationship.

Many to one relationship. 2 marks
The movie field is a foreign key which related the review table to the movie table. 2 marks
A review can be related to only one movie. 1 mark

(5 marks)

17. Spreadsheets:

The following spreadsheet was created to help 3 friends keep track of their available spending money each week.

	A	B	C	D
1	Name	Income	Expenses	Spending Money
2	Ben	400	200	200
3	Joe	200	150	50
4	Xavier	130	50	80
5	Total	730	400	330

(i). What would be the best formula to use in cell B5?

=sum(B2:B4)

(3 marks)

(ii). What would be the best formula to use in cell D2?

=B3-C3

(2 marks)

SECTION E

Graphics [10 marks]

18. A bitmap image is described as using 8 colours and having 200x100 pixels in resolution. How much space would this image take up on your hard drive in *bytes*? (Show your working)

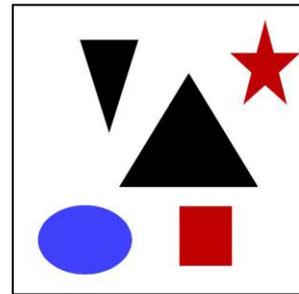
$$3 \times 200 \times 100 = 60000 \text{ bits}$$

$$= 7500 \text{ bytes}$$

(4 marks)

An artist creates a piece of art, shown below, and stores it in 4 different formats. (If the option is available in that format, the image is stored as a 16 colour, 640x480 pixel image.) The formats are:

- Vector Graphics** – Image stored as shapes
- Bitmap Graphics** – Image stored as pixels
- GIF format** – Compressed Image
- JPEG Format** – Compressed Image



Answer the following questions:

19. List the formats (by name or letter) in order of the amount of space they would take up on your hard drive - from smallest to largest. (You will have to think about how each format would store *this particular image*)

Vector, Gif, Jpeg, Bitmap

(4 marks)

20. The artist decides to resize and print out the image at ten times its normal size to make a poster. The artist tests each of the formats to see which format will look the best at this new size. He finds that in three of the formats, the edges of the shapes seem jagged and therefore ugly, but one does not. Which format would not cause jagged edges?

Vector

(2 marks)

CONTINUED

SECTION F

AI [5 marks]

21. Name two AI techniques that have been inspired by biological systems.

NN, GA

(2 marks)

22. What technology is NASA using to operate their robots on Mars?

Agents

(1 mark)

23. What is the Turing Test?

....

(2 marks)

SECTION G**Alice [5 marks]**

24. Using a *Do Together* block in your program can result in a *synchronisation error*.
Briefly explain why this error occurs.

....

(2 marks)

Events

While

Begin:

During:

End:

25. A typical Alice event is shown above. Describe what this event will make the monkey do.

....

(3 marks)

Candidate's Name: _____ 17

COMPSCI 111

Overflow Sheet 1

Write the question number next to your answer.
You must **ALSO** indicate in the allotted space that you have used the overflow sheet.

CONTINUED

Candidate's Name: _____ 18

COMPSCI 111

Overflow Sheet 2

Write the question number next to your answer.
You must **ALSO** indicate in the allotted space that you have used the overflow sheet.
