

York University

AS/AK/ITEC 1620 3.0 – Section C

OBJECT-BASED PROGRAMMING

Fall 2002

Midterm Test

Examiner: S.Y. Chen

Duration: One Hour and 30 Minutes

This exam is closed textbook(s) and closed notes. Use of any electronic device (e.g. for computing and/or communicating) is NOT permitted.

Do not unstaple this test book – any detached sheets will be discarded. Answer all questions in the space provided. No additional sheets are permitted.

Work independently. The value of each part of each question is indicated. The total value of all questions is 60.

Write your name and student number in the space below. Do the same on the top of each sheet of this exam where indicated.

NOTE: YOU MAY USE PEN OR PENCIL, BUT ANSWERS IN PENCIL WILL NOT BE CONSIDERED FOR REGRADING.

Surname: _____

Given Names: _____

Student Number: _____

Q1. _____ Q4. _____

Q2. _____ Q5. _____

Q3. _____ Q6. _____

Total

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Surname: _____ First name: _____ Student #: _____

Question 1 (10 marks) Short Answer:

Part 1 (4 marks): True/False – write “true” or “false” in the space provided.

- a. All structured programming languages must have constructs for sequence, branching, and looping. **TRUE**
- b. JAVA bytecode is machine independent, and JVM's (JAVA virtual machines) are machine dependent. **TRUE**
- c. When compiled into assembly, a program written in an object-oriented programming language will never use the “branch always” or “goto” instruction. **FALSE**
- d. A for loop will always execute its update statement(s) at least once. **FALSE**

Part 2 (6 marks): Output/Error determination – write the output (if any) or “error” in the space provided.

- a.

```
boolean t = true;
String trueString = (String) t;
York.println(trueString);
```

error
- b.

```
double a = (float) (5.5 + 3/2);
York.println(a);
```

6.5
- c.

```
int a = 10;
boolean flag = true;
if (flag)
    a += 1;
else if (!flag)
    a += 10;
York.println(a);
```

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Question 2a (5 marks) Evaluating Conditions:

When a condition is evaluated in JAVA, it is useful to know both its result (TRUE or FALSE) and which terms were evaluated. For the conditions listed below, please circle all terms that were evaluated and give the final result of the condition. Note: terms in a condition are only evaluated if the (sub) result is still unknown.

Example :

boolean a = true, b = true, c = false, d = false;

(!a && ((b || c) && !d)) | ((a && !c) || d)

TRUE

After evaluating !a, the left sub-result is known to be FALSE. Skipping to the next term in the OR expression, a is TRUE so the next term in the AND expression is evaluated. Upon evaluating !c, (a && !c) is TRUE and the right sub-result is known to be TRUE. The overall result is now known to be TRUE, so no further terms need to be evaluated.

Please answer both parts below.

Part 1 (2.5 marks):

boolean a = true, b = true, c = false, d = false;

(a && !c && d) | (c && (a || b)) | (!a) | (d && !d)

FALSE

Part 2 (2.5 marks):

boolean a = false, b = true, c = true, d = false;

(a && (!c && d)) | (c && (a || b)) | (!a || (d && !d))

TRUE

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Question 2b (5 marks) Designing if statements:

A student at York has the opportunity to participate in three extracurricular activities. She may join intramurals on Monday and Wednesday nights, a theatre group on Monday nights, or a dinner co-op on Wednesday nights.

In order to be conflict free, the student cannot join two activities on the same night.

In a JAVA program, there are three boolean variables – **intramurals**, **theatre**, and **dinner**. The value of each variable is **true** if the student will participate in that activity, and **false** otherwise.

Write an **if** statement that will set the boolean variable **conflict** to **true** if the extracurricular activities that the student participates in will cause a conflict, and to **false** if the student will not have a conflict.

Please write your answer below.

```
if ((intramurals && (theatre || dinner))
    conflict = true;
else
    conflict = false;
```

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Question 3 (10 marks) Evaluating JAVA Code:

Please answer both parts below. Note: you must show your work to receive any credit.

Part 1 (5 marks):

```
int x = 0;
for (int i = 0; i < 10; i++)
{
    if (i % 5 == 2)
        x += 50;

    x += 10;
}
```

i	x
0	10
1	20
2	70/80
3	90
4	100
5	110
6	120
7	170/180
8	190
9	200

What is the final value of x?

200

Part 2 (5 marks):

```
int x = 0;
int y = 5;
while (y <= 50)
{
    if (x > y)
        y += x;
    else
        x += y;
}
```

x	y
0	5
5	5
10	5
10	15
25	15
25	40
65	40
65	105

What is the final value of x?

65

Question 4 (10 marks) Converting Flowcharts:

Write a program in JAVA that will start by allowing two inputs: a number n which is the number of guesses you will be allowed, and my number. The program will then take up to n more inputs – each a guess that you make. Upon guessing my number, the program will output “You win”. Otherwise, the program will output “You lose” after you have run out of guesses.

For example, your program must have output like the following (user input is underlined):

Example 1:

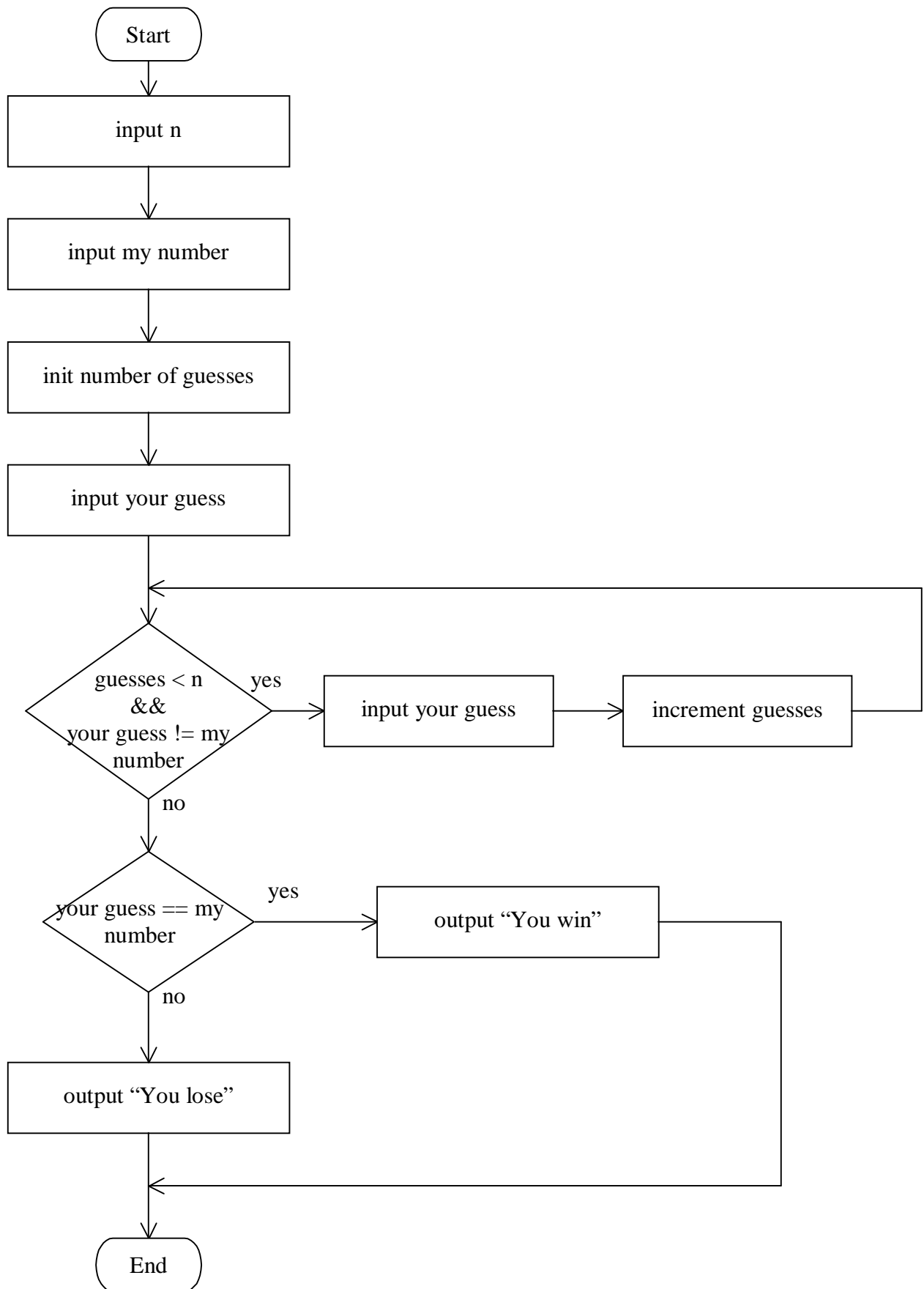
<u>3</u>	← n – the number of guesses you will be allowed
<u>8</u>	← my number
<u>7</u>	← your first guess
<u>8</u>	← your second guess
You win	← program output

Example 2:

<u>4</u>	← n – the number of guesses you will be allowed
<u>5793</u>	← my number
<u>7</u>	← your first guess
<u>8</u>	← your second guess
<u>5792</u>	← your third guess
<u>12</u>	← your fourth guess
You lose	← program output

On the following page, there is a flowchart for the required program

Please write your program on the page after the flowchart. This program must be an exact conversion of the given flowchart.



Surname: _____ First name: _____ Student #: _____

```
public class Question4
{
    public static void main( String args [] )
    {
        int n = York.readInt();
        int myNumber = York.readInt();
        int guesses = 1;

        int guess = York.readInt();
        while (guesses < n && guess != myNumber)
        {
            guess = York.readInt();
            guesses++;
        }

        if (guess == myNumber)
            York.println("You win");
        else
            York.println("You lose");
    }
}
```

Question 5 (10 marks) JAVA programming:

Write a program in JAVA that will determine which of three input integers is the middle value. Note: you may assume that none of the three inputs will be duplicate values.

For example, your program must have output like the following (user input is underlined):

Example 1:

12
4
7
7

Example 2:

1
2
3
2

Example 3:

5
0
7
5

Please write your program on the following page.

You may use this page for rough work, but anything on this page will not be graded.

Surname: _____ First name: _____ Student #: _____

```
public class Question5
{
    public static void main( String[] args )
    {
        int num1 = York.readInt();
        int num2 = York.readInt();
        int num3 = York.readInt();

        if ((num1 > num2 && num2 > num3) ||
            (num3 > num2 && num2 > num1))
            York.println(num2);
        else if ((num1 > num3 && num3 > num2) ||
                (num2 > num3 && num3 > num1))
            York.println(num3);
        else
            York.println(num1);
    }
}
```

Question 6 (10 marks) JAVA programming:

Write a program in JAVA that will first take two integers as input. The program will then output all integers between 1 and the product of the two inputs (inclusive) that are not exact multiples of either input.

For example, your program must have output like the following (user input is underlined):

Example 1:

3
4
1
2
5
7
10
11

Example 2:

2
5
1
3
7
9

Please write your program on the following page.

You may use this page for rough work, but anything on this page will not be graded.

Surname: _____ First name: _____ Student #: _____

```
public class Question6
{
    public static void main( String[] args )
    {
        int num1 = York.readInt();
        int num2 = York.readInt();

        for (int i = 0; i < num1 * num2; i++)
            if (i%num1 != 0 && i%num2 != 0)
                York.println(i);
    }
}
```