





# Unit 1 – ICS3U0 – Introduction to Java

Sample Test, Fall 2022

Name: Solutions

Total	Knowledge 	Communication 	Thinking 	Application 
(110)	(33)	(20)	(31)	(26)

## Knowledge

1. Answer the following questions:

What is the symbol for and? <u>&amp;&amp;</u>	What is T && T? <u>T</u>	What is T    T? <u>T</u>
What is the symbol for or? <u>  </u>	What is F && F? <u>F</u>	What is F    F? <u>F</u>
What is the symbol for not? <u>!</u>	What is T && F? <u>F</u>	What is T    F? <u>T</u>
What is !T? <u>F</u>	What is F && T? <u>F</u>	What is F    T? <u>T</u>
What is !F? <u>T</u>		

/5

2. Write a Boolean expression to represent each of the following:

/4

- x is greater than 50
- x is equals 7
- x is between 40 and 50
- x is less than 40 or greater than 50

x > 50  
x == 7 Two = for Boolean Exp  
x > 40 && x < 50 Two pieces joined by &&  
x < 40 || x > 50

3. The following questions are based on this class.

/10

```
public class ifs class name + save as
{
    public static void main (String args[]) main method
    {
        new ifs ();
    }
    public ifs () Constructor
    {
        int num = IO.inputInt ("Number? ");
        → if (num == 1)
            System.out.print ("leaf ");
        else if (num > 30)
            System.out.print ("orange ");
        else if (num == 14)
            System.out.print ("yellow ");
        → if (num < 3)
            System.out.print ("fall ");
        else
            System.out.print ("rake ");
    }
}
```

Two ifs!  
 Can print two things.

Identify the following in the code:

(a)	What is the name of the class?	<u>ifs</u>
(b)	Identify a Boolean expression in the code.	<u>num == 1</u>
(c)	What type of variable is declared?	<u>int</u>
(d)	What is the variable name?	<u>num</u>
(e)	What should the file be saved as?	<u>ifs.java</u>

Don't forget

What is printed for each of the following inputs?

num is 1	<u>leaf fall</u>
num is 30	<u>rake</u>
num is 31	<u>orange rake</u>
num is 14	<u>yellow rake</u>
num is -2	<u>fall</u>

4. If x is 8 and y is 2, then what are the values of the following? Show all of the steps.

/4

a)  $x > 3 \ || \ y \neq 9$   
= 8 > 3 || 2 != 9  
= T || T  
= T

b)  $x < y \ \&\& \ !(x == 1)$   
= 8 < 2 && !(8 == 1)  
= F && !F  
= F && T  
= F

5. If x is 3 and y is 2, evaluate the following. (circle the correct answer)

/10

True False Error a)  $!(x > y)$  True False Error f)  $x \% 2 == 0$   
True False Error b)  $1 < x < 5 \ x > 1 \ \&\& \ x < 5$  True False Error g)  $(x == 2) \ \&\& \ (y == 2)$   
True False Error c)  $!(x = y) \ !(x == y)$  True False Error h)  $y <= x$   
True False Error d)  $(x != 3) \ || \ (y == 2)$  True False Error i)  $x == x$  *pointless.*  
True False Error e)  $y >= 4 \ \ y >= 4$  True False Error j)  $(x != 0) \ || \ (x == 0)$  *also pointless*

## Communication

6. Fill in the blanks in the Madlibs story after looking at the output below.

/6

### Input/Output

Enter a number: 99  
Enter another number: 1  
Enter yet another number: 12  
Enter an adjective: smelly  
Enter a place: fire department

House for Sale! Very smelly!!!

This smelly house has 99 bedroom(s) and 1 bathroom(s). It is conveniently located near the local fire department which buyers will find very smelly. Cost = \$12

```
public class House
{
    public static void main (String args[])
    {
        new House ();
    }

    public House ()
    {
        int num1 = IO.input Int ("Enter a number: ");
        int num2 = IO.inputInt ("Enter another number: ");
        int num3 = IO.inputInt ("Enter yet another number:");
        String adj = IO.inputString ("Enter an adjective : ");
        String place = IO.inputString ("Enter a place:");
        System.out.println ("\nHouse for Sale! Very " + adj + "!!!\n");
        System.out.println ("This " + adj + " house has " + num1 + " bedroom(s) and ");
        System.out.println (num2 + " bathroom(s). It is conveniently located ");
        System.out.println ("near the local " + place + " which buyers ");
        System.out.println ("will find very " + adj + ". Cost = $" + num3 );
    }
}
```

7. Why is a flowchart useful? (two points, one sentence for each)

/2

- ① A flowchart is useful to visualize the sequence of steps and flow through a program. By using shapes and arrows the order and operations of code can become clearer. ② A flowchart is useful in the planning stages of code. It is language independent and can be used to design the sequence of events.

8. Provide the term for each definition.

/8

declare	The creation of a new variable. Eg. <code>int x = 0;</code>
main	The name of the method that starts the program.
constructor	The name of the method where you place your code.
Math.PI	The way to write $\pi$ in java.
Math.pow(x, z)	The way to write $x^z$ in java.
public	The first keyword that appears in a java program.
if	A control structure that is a decision statement in java.
Boolean	An expression that evaluates to true or false.

9. Why shouldn't you declare all variables as Strings? (two reasons, one sentence for each)

/2

① Strings take up the most memory of all the variable types. If you only need 1 char's 8 bits, that is a better choice than a long string. ② Strings can't do math operations. If you want to subtract multiply or have counting loops, you need ints or doubles.

10. Why is binary used to store all information on computers? (2 points, one sentence for each)

/2

① Binary is a sequence of 0's and 1's - for example nine is 1001. ② Because it only uses 2 values (0,1) it is ideally suited to store information on hardware. 1 can be stored as on, for example, and 0 as off.

## Thinking



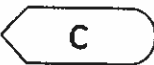


11. Assume all numbers are integers. What are the answers to the following questions?

/4

10/5	2	7/0	error	10/24	0	203/1	203
10%5	0	7%0	error	10%24	10	203%1	0

12. Match the flowchart symbol with its description AND the statement that might appear in it.

/8

				
<u>E</u> Process	<u>C</u> <code>System.out.println("Fall leaves");</code>	<u>A</u> <code>x &gt;= 90</code>	<u>B</u> <code>int age = IO.inputInt("Age? ");</code>	<u>E</u> <code>tax = total * 0.13;</code>
<u>D</u> Terminal	<u>B</u> <code>int age = IO.inputInt("Age? ");</code>	<u>E</u> <code>tax = total * 0.13;</code>	<u>A</u> Decision	<u>D</u> End
<u>B</u> Input				
<u>C</u> Output				
<u>A</u> Decision				

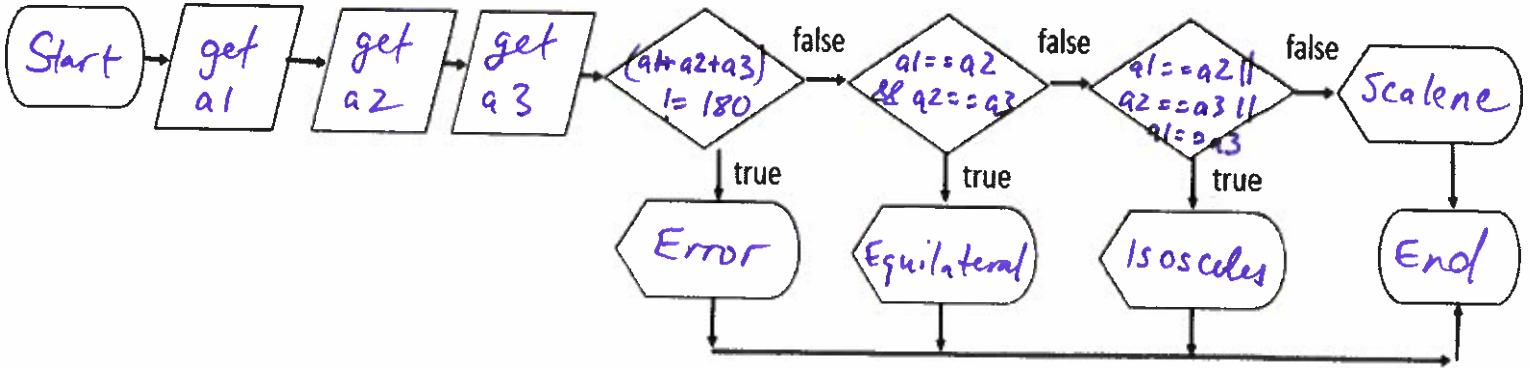
13. Classify each piece of input with the most appropriate type.

- |            |   |          |  |                    |   |
|------------|---|----------|--|--------------------|---|
| (a) Gorski | <div style="border: 1px solid black; padding: 2px; display: inline-block;">String</div> | (c) 45.3 | <div style="border: 1px solid black; padding: 2px; display: inline-block;">double</div>  | (e) (905) 453-9220 | <div style="border: 1px solid black; padding: 2px; display: inline-block;">String</div> |
| (b) -111   | <div style="border: 1px solid black; padding: 2px; display: inline-block;">int</div>    | (d) true | <div style="border: 1px solid black; padding: 2px; display: inline-block;">boolean</div> | (f) L4V 5E6        | <div style="border: 1px solid black; padding: 2px; display: inline-block;">String</div> |

14. Use the code to fill in the blanks on the flow chart below.

```

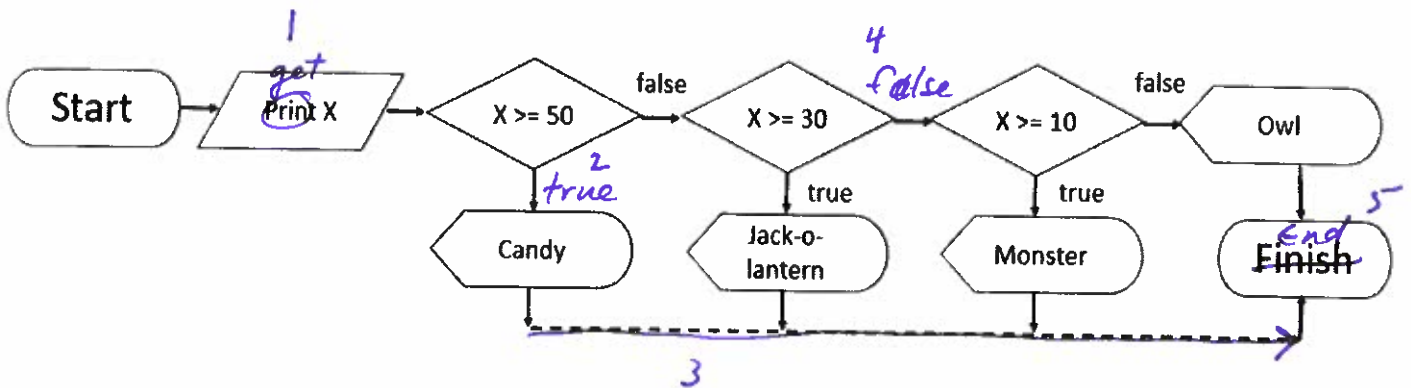
The Code:
int a1 = IO.inputInt ("Angle #1? ");
int a2 = IO.inputInt ("Angle #2? ");
int a3 = IO.inputInt ("Angle #3? ");
if ((a1 + a2 + a3) != 180)
    System.out.println ("Error");
else if (a1 == a2 && a2 == a3)
    System.out.println ("Equilateral");
else if (a1 == a2 || a2 == a3 || a1 == a3)
    System.out.println ("Isosceles");
else
    System.out.println ("Scalene");
    
```



15. Why are each of the following variable names inappropriate?

- snow! ..variable names can't have special characters ( ! )
- int ..variable names can't be keywords
- user name ..variable names can't have spaces
- 4winter ..variable names can't start with numbers

16. Circle and correct 5 errors in this flowchart.



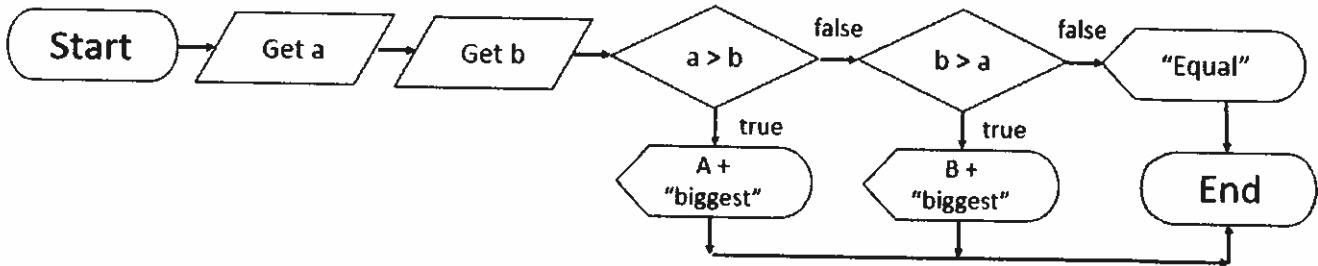
## Application

For all of these programs: **Don't include the public class stuff.**

Sample runs of the program are shown. The user input is underlined. Format output **exactly** as shown.

17. Write code that would result from this flowchart. (a and b are integers)

/6



```
int a = 10; inputInt("Enter the value of a: ");
int b = 10; inputInt("Enter the value of b: ");
```

```
if (a > b)
    System.out.println(a + " biggest");
else if (b > a)
    System.out.println(b + " biggest");
else
    System.out.println("equal");
```

18. Write a program that gets the number of minutes and efficiently calculates the number of hours and minutes left over. Be careful to format the zeros correctly. Three runs of the program are shown. /5

How many minutes? <u>243</u> 4:03	How many minutes? <u>0</u> 0:00	How many minutes? <u>1160</u> 19:20
--------------------------------------	------------------------------------	--

```
int mins = 10; inputInt("How many minutes? ");
int hours = min / 60;
min = min % 60;

if (min < 10)
    System.out.println(hours + ":0" + min);
else
    System.out.println(hours + ":" + min);
```

19. Alan Turing is running in a by-election against Dennis Ritchie. Make a program that asks how many votes each candidate received. Calculate the percentage of votes for Turing and for Ritchie. Also, print out who won the election: don't forget that they might tie. /15

Hint: Remember `\t` and `\n`.

Enter the number of votes for Turing: 1276  
 Enter the number of votes for Ritchie: 952

1  Total Votes: 2228  
 Turing: 57.27% 3  
 Ritchie: 42.73% 4  
 5  Turing won.

```
int turing = IO.inputInt("Enter the number of votes for Turing:");
int ritchie = IO.inputInt("Enter the number of votes for Ritchie:");
```

```
int total = turing + ritchie;
double turPercent = turing / total * 100;
double ritPercent = ritchie / total * 100;
```

```
System.out.println(); ← 1
System.out.println("Total Votes: \t" + total); ← 2
System.out.println("Turing: \t" + turPercent + "%"); ← 3
System.out.println("Ritchie: \t" + ritPercent + "%"); ← 4
System.out.println(); ← 5
```

```
if (turing > ritchie)
    System.out.println("Turing won.");
else if (ritchie > turing)
    System.out.println("Ritchie won.");
else
    System.out.println("Tie");
```