

South Louisiana Community College
ASDV 1220, Programming Fundamentals
Lab 6

Learning Objectives

After completion of this lab, you should be able to

1. Understand the **if** construction and usage
2. Understand the **if-else** construction and usage
3. Understand how to use the **Scanner** object without a named variable
3. Build basic **if-conditions** using the relations operators

Create project Lab6

Problem 1

Inside the main of Lab6, write code as shown below and run it. Understand how the if statement evaluates the condition inside the parenthesis to either true or false. Compile and run the class.

```
1  package lab6;
2  import java.util.Scanner;
3  public class Lab6
4  {
5      public static void main(String[] args)
6      {
7          System.out.println("Please type a positive number: ");
8          Scanner scan = new Scanner(System.in);
9          int number = scan.nextInt();
10
11          if ( number >= 0 )
12              System.out.println( "You did type a positive number! It was number " + number + "!");
13      }
14  }
15
16
```

Problem 2

Create a class called **If1**. Type in the code as given below. Read and understand the comments inside then main class of If1 as we have eliminated the variable **scan** of problem 1 but we still have the same correct results and no compiling errors! Compile and run the class.

```
1 package lab6;
2
3 import java.util.Scanner;
4 public class If1
5 {
6     public static void main(String[] args)
7     {
8         System.out.println("Please type a positive number: ");
9
10        //Observe that the variable scan is eliminated
11        //Explanation: We create a new object by using "new Scanner" and
12        //then the DOT (.) nextInt() uses that new object ( new variable) to read.
13        int number = new Scanner(System.in).nextInt();
14
15        if ( number >= 0 )
16            System.out.println( "You did type a positive number! It was number " + number + "!");
17    }
18 }
19
```

Problem 3

Create a class called **If2**. Type in the code as given below. In the worksheet explain in English line 11. Compile and run the class.

```
1 package lab6;
2
3 import java.util.Scanner;
4
5 public class If2
6 {
7     public static void main(String[] args)
8     {
9         System.out.println("Please type a positive number: ");
10
11        if ( new Scanner(System.in).nextInt() >= 0 )
12            System.out.println( "You did type a positive number!" );
13    }
14 }
15
```

Problem 4

Create a class called **If3**. Type in the code as given below. Observe line 11 of the code below. Inside the condition of the if statement the following occurs in that order:

EXPLANATION OF IF-CONDITION

1. The new Scanner is created
2. The Scanner object created is DOTed and access nextInt() to read an integer for the keyboard.
3. The int read from keyboard is assigned to a variable named **number**.
4. The **number** variable is compared to test if its is greater or equal to 0 and the if-condition evaluates to either true or false.

Compile and run the class.

Make sure that you understand all the steps described above or ask if you don't understand!

```
1 package lab6;
2
3 import java.util.Scanner;
4
5 public class If3
6 {
7     public static void main(String[] args)
8     {
9         System.out.println("Please type a positive number: ");
10        int number;
11        if ( ( number = new Scanner(System.in).nextInt() ) >= 0 )
12            System.out.println( "You did type a positive number!" + " It was number " + number);
13    }
14 }
15 }
```

Problem 5

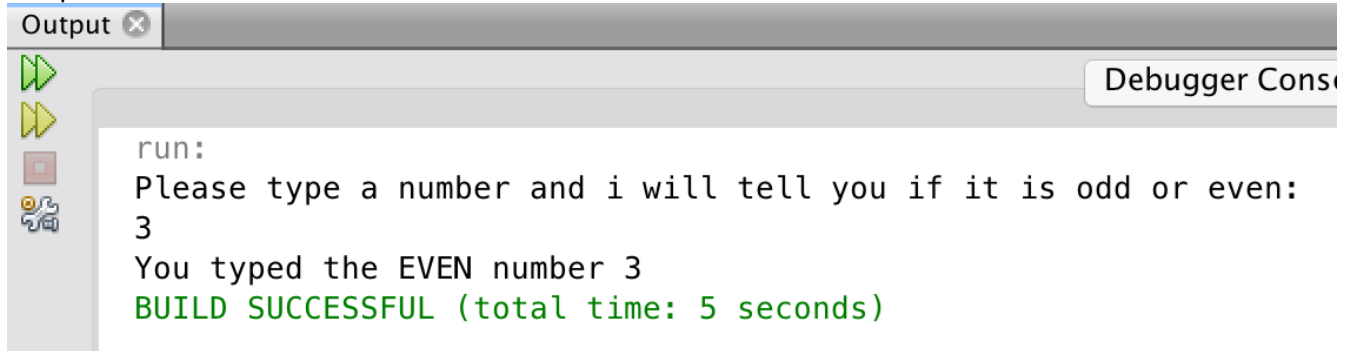
Create a class called **IfElse1**. Type in the code as given below. Make sure you understand the **if-else** alternative construction. Only if the **if-condition** evaluates to false, the **else** is executed. Compile and run the class.

```
1 package lab6;
2
3 import java.util.Scanner;
4
5 public class IfElse1
6 {
7     public static void main(String[] args)
8     {
9         System.out.println("Please type a positive number: ");
10        Scanner scan = new Scanner(System.in);
11        int number = scan.nextInt();
12
13        if ( number >= 0 )
14            System.out.println( "You did type a positive number! It was number " + number + "!");
15        else
16            System.out.println( "Come on dude! Type a POSITIVE number! Not the negative " + number + "!");
17    }
18 }
19 }
```

Problem 6

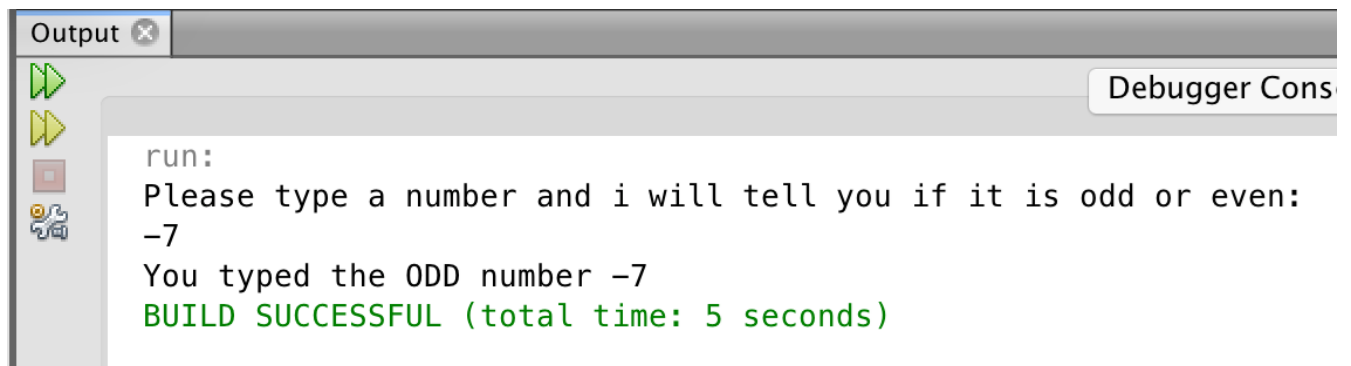
Create a class called **IfElse2**. Inside its main write code that prompts the user to type a number and the program prints whether the number was odd or even.

Sample run 1:



```
run:
Please type a number and i will tell you if it is odd or even:
3
You typed the EVEN number 3
BUILD SUCCESSFUL (total time: 5 seconds)
```

Sample run 2:



```
run:
Please type a number and i will tell you if it is odd or even:
-7
You typed the ODD number -7
BUILD SUCCESSFUL (total time: 5 seconds)
```

Problem 7

Create a class called **IfElse3**. Type in, the code as given below. Compile and run the class. Run it multiple times and observe the different output depending on the input value. Understand how it works by running for different inputs.

```
1  package lab6;
2
3  import java.util.Scanner;
4
5  public class ifElse3
6  {
7      public static void main(String[] args)
8      {
9          System.out.println("Please type a today's temperature and i will comment on it: ");
10         Scanner scan = new Scanner(System.in);
11         double todaysTemperature = scan.nextDouble();
12
13         if ( todaysTemperature > 120 )
14             System.out.println( "Come on dude! Be serious!");
15         else if ( todaysTemperature > 100 )
16             System.out.println( "very, very hot at " + todaysTemperature + "!");
17         else if ( todaysTemperature > 85 )
18             System.out.println( "hot at " + todaysTemperature );
19         else if ( todaysTemperature > 70 )
20             System.out.println( "pleasant at " + todaysTemperature );
21         else if ( todaysTemperature > 40 )
22             System.out.println( "a bit cold at " + todaysTemperature );
23         else
24             System.out.println( "bbbrrrrr at " + todaysTemperature + "!");
25     }
26 }
```

Problem 8

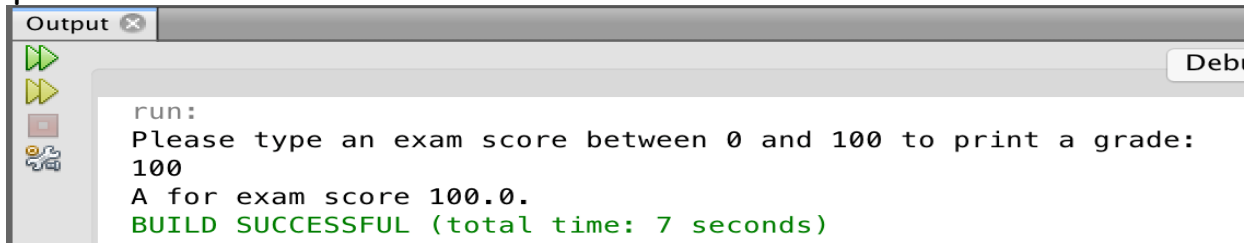
Create a class called **IfElse4**. Write code inside its main which does the following:

2. Prompts the user to enter an exam score between 0 and 100
3. Reads an exam
4. It prints a grade using the following scale depending on the exam
A --- 90 - 100
B --- 80 - 89
C --- 70-79
D --- 60-69
F --- 0 - 59

In case the exam is over 100 or below 0 it prints invalid number

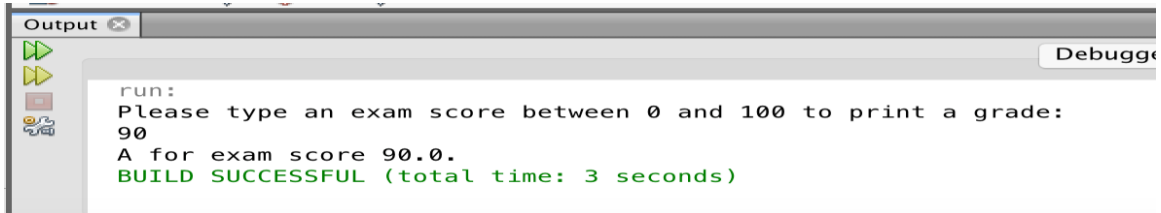
Fill out the test plan in the worksheet

Sample run 1



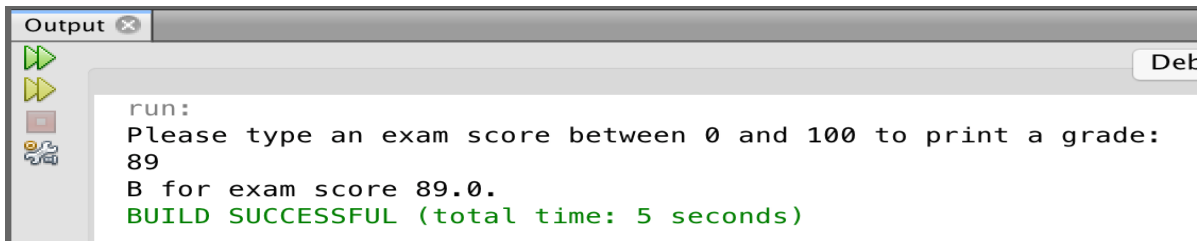
```
Output x
run:
Please type an exam score between 0 and 100 to print a grade:
100
A for exam score 100.0.
BUILD SUCCESSFUL (total time: 7 seconds)
```

Sample run 2



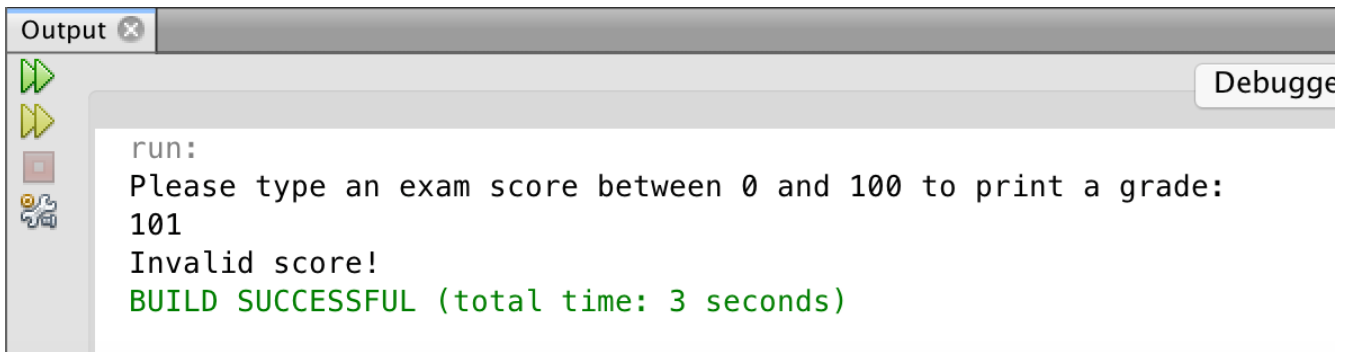
```
Output x
run:
Please type an exam score between 0 and 100 to print a grade:
90
A for exam score 90.0.
BUILD SUCCESSFUL (total time: 3 seconds)
```

Sample run 3



```
Output x
run:
Please type an exam score between 0 and 100 to print a grade:
89
B for exam score 89.0.
BUILD SUCCESSFUL (total time: 5 seconds)
```

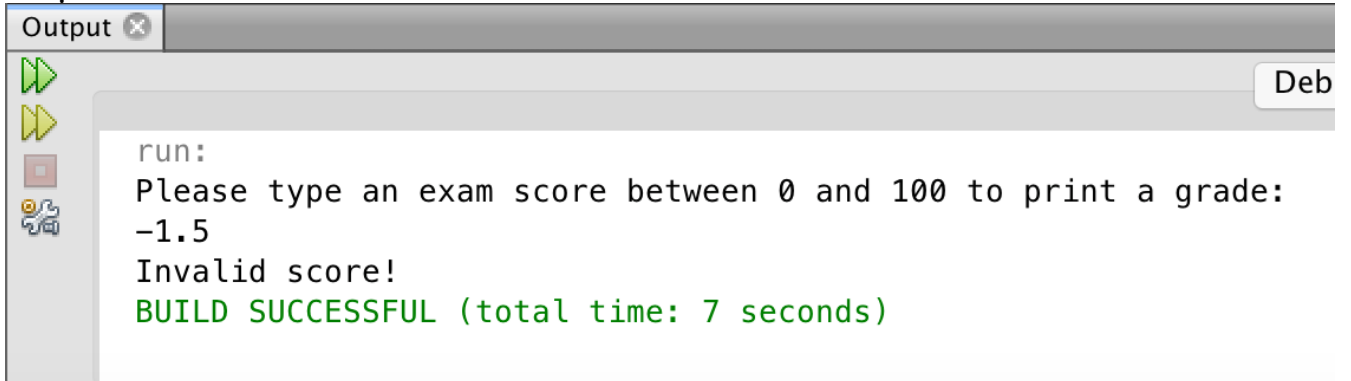
Sample run 4



Output [x] Debugge

```
run:  
Please type an exam score between 0 and 100 to print a grade:  
101  
Invalid score!  
BUILD SUCCESSFUL (total time: 3 seconds)
```

Sample run 5



Output [x] Deb

```
run:  
Please type an exam score between 0 and 100 to print a grade:  
-1.5  
Invalid score!  
BUILD SUCCESSFUL (total time: 7 seconds)
```

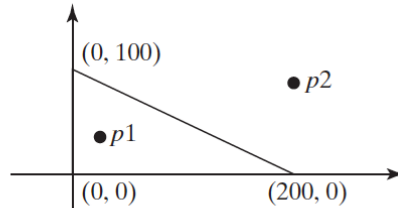
Problem 9

Create a class Triangle

a) Implement the class according to the description that follows.

b) Provide and upload a Word document with a Test Plan for all the variables used in your program.

****3.27** (Geometry: points in triangle?) Suppose a right triangle is placed in a plane as shown below. The right-angle point is placed at $(0, 0)$, and the other two points are placed at $(200, 0)$, and $(0, 100)$. Write a program that prompts the user to enter a point with x- and y-coordinates and determines whether the point is inside the triangle. Here are the sample runs:



Sample runs:

1/3 SOLUTIONS



Enter a point's x- and y-coordinates: 100.5 25.5
The point is in the triangle



Enter a point's x- and y-coordinates: 100.5 50.5
The point is not in the triangle

Logic behind the solution:

If the point is NOT in the first quadrant then it is not inside the triangle. If the point (x, y) is in the first quadrant and the slope the point (x, y) makes with point $(200, 0)$ is greater than the slope made by points $(0, 100)$ and $(200, 0)$ then (x, y) is INSIDE the triangle, else outside.

Problem 10

Complete the missing code for all tax branches.

<i>Marginal Tax Rate</i>	<i>Single</i>	<i>Married Filing Jointly or Qualifying Widow(er)</i>	<i>Married Filing Separately</i>	<i>Head of Household</i>
10%	\$0 – \$8,350	\$0 – \$16,700	\$0 – \$8,350	\$0 – \$11,950
15%	\$8,351 – \$33,950	\$16,701 – \$67,900	\$8,351 – \$33,950	\$11,951 – \$45,500
25%	\$33,951 – \$82,250	\$67,901 – \$137,050	\$33,951 – \$68,525	\$45,501 – \$117,450
28%	\$82,251 – \$171,550	\$137,051 – \$208,850	\$68,526 – \$104,425	\$117,451 – \$190,200
33%	\$171,551 – \$372,950	\$208,851 – \$372,950	\$104,426 – \$186,475	\$190,201 – \$372,950
35%	\$372,951+	\$372,951+	\$186,476+	\$372,951+

```
import java.util.Scanner;

public class ComputeTax {
    public static void main(String[] args) {
        // Create a Scanner
        Scanner input = new Scanner(System.in);

        // Prompt the user to enter filing status
        System.out.print("(0-single filer, 1-married jointly or " +
            "qualifying widow(er), 2-married separately, 3-head of " +
            "household) Enter the filing status: ");

        int status = input.nextInt();

        // Prompt the user to enter taxable income
        System.out.print("Enter the taxable income: ");
        double income = input.nextDouble();

        // Compute tax
        double tax = 0;

        if (status == 0) { // Compute tax for single filers
            if (income <= 8350)
                tax = income * 0.10;
            else if (income <= 33950)
                tax = 8350 * 0.10 + (income - 8350) * 0.15;
            else if (income <= 82250)
                tax = 8350 * 0.10 + (33950 - 8350) * 0.15 +
                    (income - 33950) * 0.25;
            else if (income <= 171550)
                tax = 8350 * 0.10 + (33950 - 8350) * 0.15 +
                    (82250 - 33950) * 0.25 + (income - 82250) * 0.28;
            else if (income <= 372950)
                tax = 8350 * 0.10 + (33950 - 8350) * 0.15 +
                    (82250 - 33950) * 0.25 + (171550 - 82250) * 0.28 +
                    (income - 171550) * 0.33;
            else
                tax = 8350 * 0.10 + (33950 - 8350) * 0.15 +
                    (82250 - 33950) * 0.25 + (171550 - 82250) * 0.28 +
                    (372950 - 171550) * 0.33 + (income - 372950) * 0.35;
        }
        else if (status == 1) { // Compute tax for married file jointly
            // Left as exercise in Programming Exercise 3.13
        }
        else if (status == 2) { // Compute tax for married separately
            // Left as exercise in Programming Exercise 3.13
        }
        else if (status == 3) { // Compute tax for head of household
            // Left as exercise in Programming Exercise 3.13
        }
        else {
            System.out.println("Error: invalid status");
            System.exit(1);
        }

        // Display the result
        System.out.println("Tax is " + (int)(tax * 100) / 100.0);
    }
}
```