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Homework 2 – The Basics of Java – If Statements and Data Types

Aim

The aim of this lab is to learn about different variable types, integer arithmetic, and if statements. If very important in Java.

Area of a Circle

In your lab this week, you worked on various simple problems. Here, we will solve a real problem, the area of a circle, $a = \pi r^2$. Comment out your previous code in your calculations class, but do not delete it!

- Assuming that the radius is 7, use variables to create a calculation. Look at the results of your calculations. Do they match what you expect? If you do not understand, ask a TA.

- Assume that the radius is defined using the double variable named radius, and then write a small program to calculate and display the area of a circle. The console output should look like:

```
The radius is 3.0
The area is 28.274333882308138
```

- Once you have done this, the next thing we wish to do is build a simple if statement to decide if the circle is big enough. IF the area of a circle is greater than a certain threshold, then we want to display an additional message saying it is a big circle, ELSE, we want to say this is a small circle.

- The basic IF statement you need is:

```
if(area>threshold){
            display something;
 }
 else {
          display something different;
 }
```

- When you have it working, set the threshold variable to be 50, and experiment with different values of radius. For example, here are two different messages for under and over the limit:

```
The radius is 3.0
The area is 28.274333882308138
This is a small circle

-----------------------------------------------

The radius is 7.0
The area is 153.93804002589985
This is a big circle
```

- When you have this working, you have successfully made use of Java to solve a real world calculation, and you created a working IF statement!

Gender switches with Booleans

The very first program you made last week was a "hello" paragraph to describe yourself. The output should look something like:

```
Hello Andrew

Hello Joe

My name is Andrew, and I'm a lecturer in CS

My name is Andrew, my school was Montrose, and my hometown is
Arbroath.

Name: Andrew, Age: 32, Student number: 12345678
```

- You should also have replaced the individual values with variables, so that you could easily substitute your classmate's details in.

```
System.out.println("Name: "+ yourName +", Age: " +age + ",
Student number: " + studNum);
```

- The next challenge is that we wish to make this third person, and we should also use a **Boolean** variable (i.e. true or false) to determine whether to use the male or female. For example, if female = true, then we should see:
  `Her name is Andrew, and she is a lecturer in CS`

- Whereas if female = false, then we should see
  `His name is Andrew, and he is a lecturer in CS`

- This is challenging, and will require string variables for gender, an If statement, and Boolean variables!

Days of The Week - Multiple Condition If statements

An alternative way to represent the nested if statements in your lab task is to use the AND (&&) operator, as discussed in the lecture notes. This will prevent confusing nested if statements.

- If you have completed your Days of the Week project this week, you should have a series of complex nested if statements, that look like this:

```
if(condition1 ==true){
      if(condition2 == value){
            Display output
      }   else if(condition2 == value2){
            Display output
      } else {
            No output found
      }
}
```

- You could also represent this if statement with the && operator

```
if((condition1 ==true) &&(condition2 == value)) {
      Display output
}
else if((condition1 ==true) &&(condition2 == value2)) {
     Display output
} else {
      No output found
}
```

- Note that this approach has strengths and weaknesses. Create a copy of your days of the week class, and try to implement your code using multiple operators.

- Note the use of brackets and the && operator!