Unit 3 → Boolean and If Statements

Boolean Expressions

- Boolean expressions *always* return true/false
  - ==
    - Tests if two values are equal
  - !=
    - Tests if two values are *not* equal
  - <
    - Tests if one value is greater than another
  - <=
    - Tests if one value is greater than or equal to another
  - >
    - Tests if one value is less than another
  - >=
    - Tests if one value is less than or equal to another
  - We can use modulus to figure out if a number is even or odd
    - `x % 2 == 0` → even
    - `x % 2 != 0` → odd
- Introduction to De Morgan's Law
  - !(a && b) can also be written as !a || !b
  - !(a || b) can also be written as !a && !b

If Statement

- If an expression returns a certain boolean value, it will do certain lines of code
- Can be followed by an else or else if statement
  ```
  if (boolean expression)
  {
       //do this
  }
  ```
- We can use while loops to do a repeated if statement until a certain boolean condition
  ```
  while (boolean expression)
  {
       //do this
  }
  ```

String Equality and Null
- Strings can be written two different ways…
  - `String x = "hello world";`
  - `String x = new String("hello world");`
- Strings and boolean expressions
  - String x == String y
    - Tests if both variables point to the same place in memory
  - String x.equals(String y)
    - Tests if the variables contain the same information
- Working with null
  - String x;
    - Instantly stores a null value
  - If we use x for a method a `NullPointerException` will be thrown causing the code to error
    - Example…
      `x.indexOf("hello there");` prints…
      `java.lang.NullPointerException`