Assignment 1

Que 1) What are the types of the following expressions?

Ans 1)

- 1 - Int
- 1.7 - Double
- 1.0 - Double
- 'h' - Char
- "hi" - String
- 5/8 - Int
- 1+0.5 - Double
- 7*0.5 - Double
- "hi".length – Int

Que 2)

Do the following 8-bit binary arithmetic by hand.

- $10101101_2 + 11010100_2$
- $00111110_2 + 00111011_2$
- $01001010_2 * 00110010_2$

Ans 2)

- $10101101_2 + 11010100_2 = 110000101$
- $00111110_2 + 00111011_2 = 01111001$
- $01001010_2 * 00110010_2 = 0111001110100$

Que 3) Convert the following decimal values to binary (8-bit), hex (2-digit), and octal (3-digit).

- 7
- 18
- 57
- 93
- 196

Ans 3)

- 7, Binary: 00000111, Hexadecimal: 07, Octal: 007
- 18, Binary: 00010010, Hexadecimal: 12, Octal: 022
- 57, Binary: 00111001, Hexadecimal: 39, Octal: 071
- 93, Binary: 01011101, Hexadecimal: 5D, Octal: 135
- 196, Binary: 11000100, Hexadecimal: C4, Octal: 304

4) Write a script that will calculate how far a projectile will go given a launch speed and an angle ignoring friction. Assume that the projectile is launched from ground level with a certain speed in m/s and at a certain angle in radians. Use the fact that acceleration due to gravity is 9.8m/s2

The steps in doing this would be to calculate the speed parallel and perpendicular to the ground with math.sin and math.cos, then figure out how long it takes for the projectile to slow to a vertical speed of zero ($v = v0 - at$) and use double that time as how long it stays in the air.

Ans 4)

```
import scala.io.StdIn.{readDouble, readLine}

object Main {
  def main(args: Array[String]): Unit = {
    println("Enter launch speed m/s : ")
    var launchSpeed = readDouble();

    println("Provide Angle : ")
    var angle = math.toRadians(readDouble());

    var perpSpeed = launchSpeed * math.sin(angle);
    var horSpeed = launchSpeed * math.cos(angle);

    var timeOfFlight = (2 * perpSpeed)/9.8;
    var horizontalDistance = timeOfFlight * horSpeed;

    println("Horizontal distance covered is " + horizontalDistance + "m and time of flight is " + timeOfFlight + "s");

  }
}
```

Que 5. In the REPL, declare a variable with the type String that has the name str. Give it whatever value of string you want. On the next line, type str. then hit tab to see the methods for String. By playing around with the REPL try to figure out what the following methods do.

- toUpperCase
- trim
- substring – This method takes two Int arguments.
- replace – This method can be called with two Char arguments or two String arguments.

Ans 5)

- toUpperCase - converts string to uppercase
- trim - removes leading and trailing spaces in string
- substring - gives substring between two indices provided
- replace - It replaces first argument provided with the second argument

```
object Main {
  def main(args: Array[String]): Unit = {
    val myStr = " Hello World";
    println(myStr.toUpperCase());
    println(myStr.trim);
    println(myStr.substring(3,6));
    println(myStr.replace( target = "Hello",  replacement = "New"));
  }
}
```

6. Using Scala as a calculator, figure out how much you must make each year to bring home $100,000 assuming a 27% tax rate.

Ans 6)

```
object Main {
  def main(args: Array[String]): Unit = {
    val incomeBringHome = 100000;
    val tax = 0.27;
    val actualIncome = incomeBringHome/(1-tax);
    println("You should make each year " + actualIncome + " to bring " + incomeBringHome + " per year");
  }
}
```

7. Write Boolean expressions for the following:

- Assume you have a variable called age. Tell if the person is old enough to legally drink.
- Given a height in inches, tell if a person can ride an amusement park ride that requires riders to be between 48” and 74”

Ans 7)

```scala
import scala.io.StdIn.readInt

object Main {
  def main(args: Array[String]): Unit = {
    println("Enter your age:")
    var age = readInt();

    if(age >= 21){
      println("You can Drink");
    } else {
      println("You can't Drink");
    }
  }
}
```

```scala
import scala.io.StdIn.readInt

object Main {
  def main(args: Array[String]): Unit = {
    println("Enter your Height:")
    var height = readInt();

    if(height >= 48 && height <= 74){
      println("You can Ride");
    } else {
      println("You can't Ride");
    }
  }
}
```

8. The reverse method can be called on a String. Use this to write a script where the user inputs a word (use readLine) and you tell them whether or not it is a palindrome.

Ans 8)

```
import scala.io.StdIn.readLine

object Main {
  def main(args: Array[String]): Unit = {
    println("Enter a String : ");
    var myStr = readLine();
    var reverseStr = myStr.reverse;

    if(myStr == reverseStr){
      println("Given String is a palindrome");
    } else {
      println("Given String is not a palindrome");
    }

  }
}
```