

## Homework 2 – Basic Input & Arithmetic

*Due: Friday, 16<sup>th</sup> September 2016 by 11:59am*

### Problem 1.

(10 points)

Assume the variables a,b,c and d have the integer values 25,24,28 and 22 respectively. What will be the value stored in the variable Res after each of these statements:

- 1)  $Res = a + b$
- 2)  $Res = c * 2$
- 3)  $Res = b / a$
- 4)  $Res = b - c$
- 5)  $Res = d // c$

### Problem 2.

(10 Points)

Write assignment statements which perform the following operations with variables a and b.

- 1) Add 2 to a and assign the result to b
- 2) Multiply b by 5 and assign the result to a
- 3) Divide a by 3.14 and assign the result to b
- 4) Subtract 8 from b and assign the result to a
- 5) Raise a to the power 3 and assign the result to b

### Problem 3.

(10 Points)

How would you write the following arithmetic expression in Python? Assume a,b,c,d are integer variables

$$4/3(r+34)-9(a+bc)+(3+d(2+a))/a+bd$$

**Problem 4.****(10 Points)**

Evaluate the following expressions using the order of operators. (Show the steps involved)

1)  $9 + 6 * (5 + 7) / 3 - 7$

2)  $19 - 6 / (8 - 3) * 2 - 1$

For example evaluating  $10 + 3 * (8 - 4) - 5$  involve the following steps:

$\Rightarrow 10 + 3 * 4 - 5$

$\Rightarrow 10 + 12 - 5$

$\Rightarrow 17$

**Problem 5.****(10 Points)**

Write a program which displays the following tab separated table

a	b	a**b
2	3	8
4	5	1024
5	6	15625

**Problem 6.****(10 Points)**

Write a program which asks the user to enter the temperature in Celsius and converts it to Fahrenheit.

Use the formula  $F = 5/9C + 32$ , where  $F$  is the temperature in Fahrenheit and  $C$  is the temperature in Celsius.

Sample program output:

Please enter the temperature in Celsius: 9

The temperature in Fahrenheit is: 37

**Problem 7.****(20 Points)**

**Write a program which asks the user to enter an integer between 0 and 100 and outputs the sum of the digits of the number entered.**

*Hint: You can use the modulo operator to extract digits ( $93\%10 = 3$ ) and the integer division operator to remove digits ( $91//10 = 9$ ).*

*Sample program output:*

Please enter a number between 0 and 100: 89

The sum of the digits is: 17

**Problem 8.****(20 Points)**

**Write a program which asks the user to enter an 8 digit number and outputs the number reversed.**

*Hint: You can use the modulo operator to extract digits ( $93\%10 = 3$ ) and the integer division operator to remove digits ( $91//10 = 9$ ).*

*Sample program output:*

Please enter a number: 89123231

The reverse is: 13232198

**Problem 9. (EXTRA CREDIT/OPTIONAL)****(25 Points)**

**Write a program which asks the user to enter a 6 bit binary number and outputs the number's decimal equivalent.**

*Hint: Converting a number from binary to decimal involves multiplying the bits with increasing powers of 2 and adding the result.*

*For example for the 2 bit binary number 10 the bits 1 and 0 are multiplied by 2 and 1 respectively resulting in  $2 \times 1 + 1 \times 0 = 2$ . Thus the decimal equivalent of 10 is 2.*

*Similarly for the 4 bit binary number 1011 the bits 1, 0, 1, 1 are multiplied by 8, 4, 2 and 1 respectively resulting in  $8 \times 1 + 4 \times 0 + 2 \times 1 + 1 \times 1 = 11$ . Thus the decimal equivalent of 1011 is 11.*

*Some other examples are (subscripts indicate the number system used; 2 for binary and 10 for decimal)*

*(binary)  $111_2 \rightarrow 4 \times 1 + 2 \times 1 + 1 \times 1 \rightarrow 7_{10}$  (decimal)*

*(binary)  $10001_2 \rightarrow 16 \times 1 + 8 \times 0 + 4 \times 0 + 2 \times 0 + 1 \times 1 \rightarrow 17_{10}$  (decimal)*

(binary)  $10100_2 \rightarrow 16 \times 1 + 8 \times 0 + 4 \times 1 + 2 \times 0 + 1 \times 0 \rightarrow 20_{10}$  (decimal)

*Sample program output:*

Please enter a 6 bit binary number: 101010

The decimal equivalent is: 42