

## Homework 2 – Basic input and Arithmetic

*Due on Friday, September 16, 2016 11:59 AM*

**Problem 1.** 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: **[10 points]**

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

### **Solution**

- 1) 49
- 2) 56
- 3) 0.96
- 4) -4
- 5) 0

**Problem 2.** Write assignment statements which perform the following operations with variables a and b. **[10 points]**

- 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

### **Solution**

- 1) `b = a + 2`
- 2) `a = b * 5`
- 3) `b = a / 3.14`
- 4) `a = b - 8`
- 5) `b = a ** 3`

**Problem 3.** How would you write the following arithmetic expression in Python? Assume a, b, c, d and r are integer variables. [10 points]

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

**Solution**

```
4 / 3 * (r + 34) - 9 * (a + b * c) + (3 + d * (2 + a)) / a + b * d
```

**Problem 4.** Evaluate the following expressions using the order of operators. (Show the steps involved) [10 points]

- 1)  $9 + 6 * (5 + 7) / 3 - 7$
- 2)  $19 - 6 / (8 - 3) * 2 - 1$

**Solution**

- 1)  $9 + 6 * (5 + 7) / 3 - 7$ 
  - $\Rightarrow 9 + 6 * 12 / 3 - 7$
  - $\Rightarrow 9 + 72 / 3 - 7$
  - $\Rightarrow 9 + 24 - 7$
  - $\Rightarrow 33 - 7$
  - $\Rightarrow 26$
- 2)  $19 - 6 / (8 - 3) * 2 - 1$ 
  - $\Rightarrow 19 - 6 / 5 * 2 - 1$
  - $\Rightarrow 19 - 1.2 * 2 - 1$
  - $\Rightarrow 19 - 2.4 - 1$
  - $\Rightarrow 16.6 - 1$
  - $\Rightarrow 15.6$

**Problem 5.** Write a program which displays the following tab separated table: **[10 points]**

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

**Solution [script (problem5.py) uploaded separately]**

```
# Name: Asmit De
# ID: aud311
# Date: 09/20/2016
# Assignment: Homework 2, Problem 5
# Description: Program to display a^b power table
```

```
# Display the table header
print('{0}\t{1}\t{2}'.format('a', 'b', 'a**b'))
```

```
# Calculate and display the table contents
a = 2
b = 3
print('{0}\t{1}\t{2}'.format(a, b, a ** b))
a = 4
b = 5
print('{0}\t{1}\t{2}'.format(a, b, a ** b))
a = 5
b = 6
print('{0}\t{1}\t{2}'.format(a, b, a ** b))
```

```
RESTART: C:/Users/aud311/OneDrive/PSU/TA/CMPSC 101 Introduction to Programming/
Homeworks/HW2/Solutions/problem5.py
```

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

**Problem 6.** Write a program which asks the user to enter the temperature in Celsius and converts it to Fahrenheit. **[10 points]**

***Solution [script (problem6.py) uploaded separately]***

```
# Name: Asmit De
# ID: aud311
# Date: 09/07/2016
# Assignment: Homework 2, Problem 6
# Description: Program to convert celsius to fahrenheit

# Prompt the user to enter a value in Celsius
celsius = float(input('Enter temperature in degree celsius: '))

# Convert celsius to fahrenheit
fahrenheit = (9 / 5) * celsius + 32

# Display the converted value
print('Temperature in degree fahrenheit:', fahrenheit)
```

```
RESTART: C:/Users/aud311/OneDrive/PSU/TA/CMPSC 101 Introduction to Programming/
Homeworks/HW2/Solutions/problem6.py
Enter temperature in degree celsius: 23
Temperature in degree fahrenheit: 73.4
>>>
```

**Problem 7.** 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. **[20 points]**

***Solution [script (problem7.py) uploaded separately]***

```
# Name: Asmit De
# ID: aud311
# Date: 09/20/2016
# Assignment: Homework 2, Problem 7
# Description: Program to calculate sum of digits

# Prompt the user to enter an integer between 0 and 100
num = int(input('Enter an integer between 0 and 100: '))

# Extract the digits
d0 = num % 10
d1 = num // 10

# Display the sum of the digits
print('Sum of the digits is', d0 + d1)
```

```
RESTART: C:/Users/aud311/OneDrive/PSU/TA/CMPSC 101 Introduction to Programming/
Homeworks/HW2/Solutions/problem7.py
Enter an integer between 0 and 100: 79
Sum of the digits is 16
>>> |
```

**Problem 8.** Write a program which asks the user to enter an 8 digit number and outputs the number reversed. **[20 points]**

***Solution [script (problem8.py) uploaded separately]***

```
# Name: Asmit De
# ID: aud311
# Date: 09/20/2016
# Assignment: Homework 2, Problem 8
# Description: Program to reverse a number

# Prompt the user to enter an eight digit number
num = int(input('Enter an eight digit number: '))

# Extract the digits and form the reverse number
reverse = 0
reverse += (num % 10) * (10 ** 7)
num //= 10
reverse += (num % 10) * (10 ** 6)
num //= 10
reverse += (num % 10) * (10 ** 5)
num //= 10
reverse += (num % 10) * (10 ** 4)
num //= 10
reverse += (num % 10) * (10 ** 3)
num //= 10
reverse += (num % 10) * (10 ** 2)
num //= 10
reverse += (num % 10) * (10 ** 1)
num //= 10
reverse += (num % 10) * (10 ** 0)

# Display the reversed number
print('The reverse is', reverse)
```

```
RESTART: C:/Users/aud311/OneDrive/PSU/TA/CMPSC 101 Introduction to Programming/
Homeworks/HW2/Solutions/problem8.py
Enter an eight digit number: 12345678
The reverse is 87654321
>>>
```

**Problem 9 (bonus).** Write a program which asks the user to enter a 6 bit binary number and outputs the number's decimal equivalent. **[25 points]**

***Solution [script (problem9.py) uploaded separately]***

```
# Name: Asmit De
# ID: aud311
# Date: 09/20/2016
# Assignment: Homework 2, Problem 9
# Description: Program to convert a 6-bit binary number to decimal
```

```
# Prompt the user to enter a 6-bit binary number
binary = int(input('Enter a 6-bit binary number: '))
```

```
# Extract the bits and form the decimal number
decimal = 0
decimal += (binary % 10) * (2 ** 0)
binary //= 10
decimal += (binary % 10) * (2 ** 1)
binary //= 10
decimal += (binary % 10) * (2 ** 2)
binary //= 10
decimal += (binary % 10) * (2 ** 3)
binary //= 10
decimal += (binary % 10) * (2 ** 4)
binary //= 10
decimal += (binary % 10) * (2 ** 5)
```

```
# Display the decimal number
print('The decimal equivalent is', decimal)
```

```
| RESTART: C:/Users/aud311/OneDrive/PSU/TA/CMPSC 101 Introduction to Programming/
| Homeworks/HW2/Solutions/problem9.py
| Enter a 6-bit binary number: 110101
| The decimal equivalent is 53
| >>>
```