

German University in Cairo  
Faculty of Media Engineering and Technology  
Prof. Dr. Slim Abdennadher  
Dr. Mohammed Abdel Megeed Salem

Introduction to Computer Science, Winter Semester 2018  
Practice Assignment 2

Discussion: 13.10.2018 - 18.10.2018

**Exercise 2-1** Flight Time

Write an algorithm to determine the flying time between two cities given the mileage between them and the average speed of the airplane.

**Solution:**

```
m = eval(input())
speed = eval(input())
time = m / speed

print(time)
```

**Exercise 2-2** BMI  
To be discussed in Tutorial

Write an algorithm that calculates your **BMI** given your **weight** and **height**.  
The BMI is calculated using the weight divided by height squared, where weight is in kg and height is in meters.

**Solution:**

```
weight = eval(input("enter weight: "))
height = eval(input("enter height: "))
BMI = weight/(height*height)
print(BMI)
```

**Exercise 2-3** Appliance Cost

Write an algorithm that calculates and prints the annual cost of running an appliance given the cost per kilowatt-hour in cents and the number of kilowatt-hours the appliance uses in a year.

**Solution:**

```
CostKW = eval(input())
kwUsed = eval(input())

anualCost = CostKW * kwUsed/100

print(anualCost)
```

**Exercise 2-4**    Planting Trees  
                  **To be discussed in Tutorial**

Write an algorithm that given the width and length of a garden in meters calculates the area of the garden together with the number of trees that could be planted on this garden area, knowing that each tree needs a space of 50  $cm^2$ .

**Note:** You can use the function `int(x/y)` that gives the integer part of the result of the division  $x/y$ . For example `int(5/2)=2`. You can also use the integer division operator `//` directly.

**Solution:**

```
width = eval(input())
length = eval(input())

garden_area = (width * length)
trees = int(garden_area / 0.005) # or use // for integer division

print("The area of the garden is: ")
print(garden_area)
print("Number of trees you can plant on this area: ")
print(trees)
```

**Another Solution using modulus:**

```
width = eval(input())
length = eval(input())

garden_area = (width * length)
trees = garden_area // 0.005

print("The area of the garden is: ")
print(garden_area)
print("Number of trees you can plant on this area: ")
print(trees)
```

**Exercise 2-5**    Compound Interest  
                  **To be discussed in Tutorial**

Write an algorithm that will output the account **balance** each year for 3 years given the initial **balance** and **interest** rate.

The interest is calculated for one year by multiplying the current account balance by the interest rate and adding this to the balance.

**Solution:**

```
balance = eval(input("What is your balance: "))
interest = eval(input("What is your interest: "))
balance = balance + (balance * interest/100)
print("The balance after the first year is: ")
print(balance)
balance = balance + (balance * interest/100)
print("The balance after the second year is: ")
print(balance)
balance = balance + (balance * interest/100)
print("The balance after the third year is: ")
print(balance)
```

**Exercise 2-6**    Pythagorean Theorem  
                  **To be solved in Lab**

The Pythagorean Theorem states that the sum of the squares of the two sides of a right angle triangle is equal to the square of its hypotenuse. For example, 3, 4 and 5 are the sides of a right angle triangle as they form a Pythagorean Triple ( $5^2 = 4^2 + 3^2$ ). Given 2 numbers,  $m$  and  $n$  where  $m \geq n$ , a Pythagorean Triple can be generated by the following formulae:

$$\begin{aligned} a &= m^2 - n^2 \\ b &= 2 \times m \times n \\ c &= \sqrt{a^2 + b^2} \end{aligned}$$

Write an algorithm that reads in values for  $m$  and  $n$  and prints the values of the Pythagorean Triple generated by the formulae above.

**Solution:**

```
import math # import math module, it consists of predefined math functions
m = eval(input())
n = eval(input())
a = ((m * m) - (n * n))
b = (2 * m * n)
c = (math.sqrt((a * a) + (b * b))) # math.sqrt()
print("The Pythagorean Triple consists of the following sides: ")
print(a, b, c)
```

**Exercise 2-7**    Get the Time

Write an algorithm that reads the amount of time in seconds and then displays the equivalent hours, minutes and remaining seconds.

- One hour corresponds to 60 minutes.
- One minute corresponds to 60 seconds.

**Solution:**

```
seconds = eval(input())
hours = int(seconds/3600)
seconds = seconds-(hours*3600)
minutes = int(seconds/60)
seconds = seconds-(minutes*60)

print(hours, "hours", minutes, "minutes", seconds, "seconds")
```

**Another Solution using modulus:**

```
seconds = eval(input())

hours = int(seconds/3600)
seconds = seconds % 3600
minutes = int(seconds/60)
seconds = seconds % 60

print(hours, "hours", minutes, "minutes", seconds, "seconds")
```

**Exercise 2-8**     Get the Money  
                    **To be solved in Lab**

Write an algorithm that reads the amount of money in pennies and displays the equivalent dollars, quarters, dimes, nickles and pennies.

- One dollar corresponds to 100 pennies.
- One quarter corresponds to 25 pennies.
- One dime corresponds to 10 pennies.
- One nickle corresponds to 5 pennies.

**Solution:**

```
pennies = eval(input())

dollars = int(pennies/100)
pennies = pennies-(dollars*100)
quarters = int(pennies/25)
pennies = pennies-(quarters*25)
dimes = int(pennies/10)
pennies = pennies-(dimes*10)
nickles = int(pennies/5)
pennies = pennies-(nickles*5)

print(dollars, "dollars")
print(quarters, "quarters")
print(dimes, "dimes")
print(nickles, "nickles")
print(pennies, "pennies")
```

**Another Solution:**

```
pennies = eval(input())

dollars = int(pennies/100)
pennies = pennies % 100
quarters = int(pennies/25)
pennies = pennies % 25
dimes = int(pennies/10)
pennies = pennies % 10
nickles = int(pennies/5)
pennies = pennies % 5

print(dollars, "dollars")
print(quarters, "quarters")
print(dimes, "dimes")
print(nickles, "nickles")
print(pennies, "pennies")
```

**Exercise 2-9**     Reverse Digits  
                    **To be discussed in Tutorial**

Write an algorithm that given a 3-digit number prints out the number in reversed order.

**Example:** if the number is 425 then the output should be 524.

**Solution:**

```
number = eval(input())

d1 = int(number/100)
d2 = int(number/10) % 10
d3 = number % 10

print("The number in reversed order is ",d3,d2,d1)
```

**Another Solution:**

```
number = eval(input())

d1 = number % 10
number = int(number / 10)
d2 = number % 10
d3 = int(number / 10)

print("The number in reversed order is ", d1,d2,d3)
```

**Another Solution:**

```
number = eval(input())

d1 = number % 10
number = int(number / 10)
d2 = number % 10
d3 = int(number / 10)
Sum = d1* 100 + d2*10 + d3

print("The number in reversed order is ", Sum)
```