German University in Cairo
Faculty of Media Engineering and Technology
Prof. Dr. Slim Abdennadher
Dr. Aysha ElSafty

Introduction to Computer Science, Winter Semester 2016
Practice Assignment 2

Discussion: 15.10.2016 - 20.10.2016

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.

Exercise 2-2   BMI

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.

Exercise 2-3   Appliance Cost

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

Exercise 2-4   Planting Trees

Write a function that takes as parameters the width and length of a garden in meters and calculates the area of the garden. Moreover, write a function that calculates the number of trees that could be planted on this garden area, knowing that each tree needs a space of $50cm^2$.

Exercise 2-5   Compounded Interest

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.

Exercise 2-6   Pythagorean Theorem

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.

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.

Exercise 2-8   Get the Money

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.

Exercise 2-9   Feeding Your Pets

After knowing that he will be taking the *Introduction to Computer Science* course in his first year in the GUC, a freshman engineering student decided to switch career and work as a veterinarian. In his first day at his new job, he was asked to feed 100 bones to three dogs; Dipsy, Laa-Laa, and Po. Dipsy eats twice as much as Laa-Laa eats. Laa-Laa eats one and a half times what Po eats.
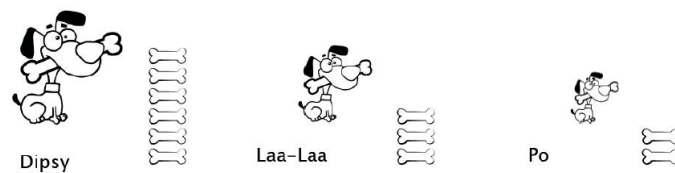
- Think of an algorithm that given the amount of bones would print out how many bones each dog will be fed.

- Enhance your algorithm by making it print out how many bones would remain after the distribution of the bones among the three dogs.

Exercise 2-10   Swaping Numbers

Write an algorithm that takes as input two numbers and swaps the values of these numbers.

- Write the algorithm using a temporary variable

- Swap the two numbers without using a temporary variable. Is it always possible to swap any two values of any types?

Exercise 2-11   Sum Digits

Write an algorithm that given a 3-digit number prints out the sum of its digits.
Example: if the number is 425 then the output should be 11.