

Homework: C Data Types

This document defines the homework assignments from [the "C Programming" Course @ Software University](#). Please submit as homework a single **zip / rar / 7z** archive holding the solutions (source code) of all below described problems.

Problem 1. Declare Variables

Declare five variables choosing for each of them the most appropriate of the types **char**, **short**, **unsigned short**, **int**, **unsigned int**, **long**, **unsigned long** to represent the following values: **52130**, **8942492113**, **-115**, **4825932**, **97**, **-10000**, **-35982859328592389**. Choose a large enough type for each number to ensure it will fit in it.

Problem 2. Float or Double?

Which of the following values can be assigned to a variable of type **float** and which to a variable of type **double**: **34.567839023**, **12.345**, **8923.1234857**, **3456.091**? Write a program to assign the numbers in variables and **print** them to ensure no precision is lost.

Problem 3. Variable in Hexadecimal Format

Declare an integer variable and assign it with the value **254** in hexadecimal format (**0x##**). Use a calculator online to find its hexadecimal representation. Print the variable and ensure that the result is **"254"**.

Problem 4. Gender

Declare a variable called **isFemale** and assign an appropriate value corresponding to **your gender**. Print it on the console.

Expected Output
true

Problem 5. Names

Declare two **string (char array) variables** holding your first name and last name. Print them in the console (mind adding an interval between them).

Sample Output
Mark Twain

Tip: Make sure you properly declare the strings by specifying a correct size. Avoid buffer overflows.

Problem 6. Quotes in Strings

Declare a string variable and assign to it the following value:

The "use" of quotations causes difficulties. \n, \t and \ are also special characters.

Print the resulting string on the console.

Expected Output

The "use" of quotations causes difficulties. \n, \t and \ are also special characters.

Problem 7. Exchange Variable Values

Declare two integer variables **a** and **b** and assign them with 5 and 10 and after that exchange their values by using some programming logic. Print the variable values before and after the exchange.

Expected Output

Before:

a = 5

b = 10

After:

a = 10

b = 5

Problem 8. Employee Data

A marketing company wants to keep record of its employees. Each record would have the following characteristics:

- First name
- Last name
- Age (0...100)
- Gender (m or f)
- Personal ID number (e.g. 8306112507)
- Unique employee number (27560000...27569999)

Declare the variables needed to keep the information for a single employee using appropriate primitive data types. Use descriptive names. **Print** the data at the console.

Expected Output

First name: Amanda

Last name: Jonson

Age: 27

Gender: f

Personal ID: 8306112507

Unique Employee number: 27563571

Problem 9. Bank Account Data

A bank account has a **holder name** (first name, middle name and last name), available **amount of money** (balance), **bank name**, **IBAN** and **3 credit card numbers** associated with the account. Declare the variables needed to keep the information for a single bank account using the appropriate data types and descriptive names.

Problem 10.* Comparing Floats

Write a program that **safely compares floating-point numbers (double)** with precision **eps = 0.000001**. Note that we cannot directly compare two floating-point numbers **a** and **b** by **a==b** because of the nature of the floating-point arithmetic. Therefore, we assume two numbers are equal if they are more closely to each other than a fixed constant **eps**. Examples:

Number a	Number b	Equal (with precision eps=0.000001)	Explanation
5.3	6.01	false	The difference of 0.71 is too big (> eps)
5.00000001	5.00000003	true	The difference 0.00000002 < eps
5.00000005	5.00000001	true	The difference 0.00000004 < eps
-0.0000007	0.00000007	true	The difference 0.00000077 < eps
-4.999999	-4.999998	false	Border case. The difference 0.000001 == eps. We consider the numbers are different.
4.999999	4.999998	false	Border case. The difference 0.000001 == eps. We consider the numbers are different.

Problem 11.* Print the ASCII Table

Find online more information about [ASCII](#) (American Standard Code for Information Interchange) and write a program to prints the entire ASCII table of characters at the console (characters from 0 to 255). Note that some characters have a special purpose and will not be displayed as expected. You may skip them or display them differently. You may need to use **for**-loops (learn in Internet how).