TND012/2019: Dugga 1

Attention

This is an **individual** home dugga. Thus, any form of cooperation with other students (e.g. LiTHehack) is seen as academic dishonesty.

Books, notes, and internet material can be used.

If you find any open questions in the presented exercise then feel free to make your own decisions. However, your decisions should be reasonable and must not contradict any of the conditions explicitly written for the exercise. Please, write comments in the program that clarify your assumptions/decisions, if any.

Remember that you should not ignore compiler warnings, since they are usually an indication of serious problems in the code. Remember to set the warning level of your compiler. For Visual Studio, you can follow the instructions given in this file.

Remember also to include in your program all the libraries used in your code (e.g. `#include <cmath>`).

Course goals

This is an assessment of whether you can

- write simple programs, with basic input and output,
- use selection statements, and
- use simple loops.

All the points above have been discussed in the Fö 1 to Fö 4 and, lessons 1, 2, and 3.

Requirements for grade G

- Readable and well indented code.
- Use of good programming practices.
- Global variables cannot be used.
- Respect for submission instructions.
- Code copied from a web page should be clearly indicated through a commented line containing the web page address used as source, with exception for the course material posted on the course website (e.g. code posted for lectures).
- Use of statements that are not part of the ISO C++ leads to automatically failing the dugga.
- Your programs must pass all test examples shown in this paper.
- Other criteria are listed in the feedback report document available from course website.

Note that there is no guarantee that your code is correct just because it passes all given test examples. Thus, you should always test your code with extra examples, you come up with.

Deadline

16 of September, 12:00.

Submission instructions

1. Submit **one** source code (`.cpp`) file for the exercise through Lisam. The file must be named with your LiU id (e.g. `ninek007.cpp`).
2. The submitted source code file must have your name and personal number at the top of the file.
3. The submitted source code (`.cpp`) file cannot be compressed (e.g. neither `.zip` nor `.rar` files are accepted).

Remember that you should deliver only the source code (`.cpp`) file. Moreover, answers to the dugga exercises sent by email are ignored.

Duggor solutions submitted not accordingly the submission instructions are ignored.

Questions

The aim of the dugga is that you solve the exercise without help of other people. However, we give you the possibility to send us questions about the problem in this dugga by email. If you are a MT student then you should email Aida Nordman (`Aida.Vitoria@liu.se`). If you are an ED or KTS student then you should email Martin Falk (`Martin.Falk@liu.se`).

Only emails received from 17:00 on Friday to 12:00 on Saturday will be answered. Emails received after 12:00 on Saturday are not answered. The emails will be answered until Saturday at 20:00.

Be brief and concrete. Emails can be written either in Swedish or English.

Note that you should not send emails related to Lisam system.

User support for Lisam

Help and support for Lisam system is available at helpdesk@student.liu.se and by calling the phone number 013-28 58 98.

Login and password to access the course material

All course material, like lecture slides and code examples, are available through the course website (**`http://weber.itn.liu.se/~aidvi05/courses/10/index.html`**). However, the material is password protected. Use the following login and password to access the material.

login: **`TND012`**   password: **`TND012ht2_12`**

Lycka till!!

Exercise

Consider a company that sells trees which are priced by height. Customers have the choice of purchasing a tree on a "cash and carry" basis, of purchasing a tree and have it delivered (delivery service), or of purchasing a tree and having it both delivered and planted (planting service). Of course, the delivery and planting services have an extra cost (and customers do not have to buy them).

We summarize below the pricing information for trees.

- Trees whose height is below one meter cost 50.
- Trees whose height is three meters or more cost 299.50.
- Trees whose height is one meter or more but less than two meters cost 109.
- Trees whose height is two meters or more but less than three meters cost 199.

Pricing information for extra services is given below.

- Delivery service costs 120 per tree.
- The delivery service has a maximum cost of 600 per order. In other words, if a customer buys more than five trees than she only pays for five trees ($5 \times 120 = 600$).
- Planting services (which also include delivery) cost 50% of the trees' cost.

Write a program that starts by requesting the number of trees purchased (`int`), their height (`double`), and extra services bought (`int`) and then displays an invoice as shown in the examples below. Assume that all trees purchased in one order have the same height.

Note that when the user is requested for information about the purchase of extra services,

- "`0`" should be entered to indicate that no extra service was purchased;
- "`1`" should be entered to indicate that delivery service was purchased;
- "`2`" should be entered to indicate that planting service was purchased.

Your program should validate the purchase information given by the user (for instance, number of trees should not be negative and trees' height should be a positive number). If the user input is not valid then an error message should be displayed and the program should request the purchase information, again.

Assume that the user always enters numbers as input for the program.

Note that the invoice created by your program should contain the same information as in the given examples. All costs in the invoice should be displayed with two digits after the decimal point. Perfect alignment of the different items in the displayed invoice is not a requirement.

Five examples of the program execution are given below. Values in green color are entered by the user.

Example 1

```
Number of trees purchased: 4
Tree height: 2.5
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 2
=================================
             Invoice
=================================
4 trees * 199.00 each:     796.00
      Delivery charge:       0.00
      Planting charge:     398.00
                         ---------
     Total amount due:    1194.00
```

Example 2

```
Number of trees purchased: 10
Tree height: 3.6
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 1
=================================
             Invoice
=================================
10 trees * 299.50 each:    2995.00
       Delivery charge:     600.00
       Planting charge:       0.00
                          ---------
      Total amount due:    3595.00
```

Example 3

```
Number of trees purchased: 4
Tree height: -0.5
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 1
Purchase information not valid!!

Number of trees purchased: 4
Tree height: 0.5
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 1
=================================
             Invoice
=================================
4 trees * 50.00 each:     200.00
     Delivery charge:     480.00
     Planting charge:       0.00
                         ---------
    Total amount due:     680.00
```

Example 4

```
Number of trees purchased: 5
Tree height: 1.7
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 3
Purchase information not valid!!

Number of trees purchased: 5
Tree height: 1.7
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 1
=================================
             Invoice
=================================
5 trees * 109.00 each:     545.00
      Delivery charge:     600.00
      Planting charge:       0.00
                          ---------
     Total amount due:     1145.00
```

Example 5

```
Number of trees purchased: -5
Tree height: -3.6
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 2
Purchase information not valid!!

Number of trees purchased: 5
Tree height: 3.6
Extra services (0 -> none, 1 -> delivery, 2 -> planting): 2
=================================
             Invoice
=================================
5 trees * 299.50 each:    1497.50
      Delivery charge:       0.00
      Planting charge:     748.75
                         ---------
     Total amount due:    2246.25
```