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EN 001203 Computer Programming

Mid-Term Exam

Faculty of Engineering, Khon Kaen University

Academic Year 2563 Semester 2

19 February 2021, 13:00 – 16:00

Instructions:

1. There are 9 problems each worth 60 points. Full scores require every problem solved.
2. This is a closed book exam.
* **No other reading materials are allowed.**
3. **Network communication is allowed only for**
(a) **submission of the answers to the designated system and**
(b) **consulting reference, i.e., www.cppreference.com and www.cplusplus.com.**
* **Personal communication, social media, file sharing (in other systems), or internet searching is NOT allowed.**
4. Name each file as follows:
* Name your submission program by the corresponding problem: **Px.cpp**
For example, P1.cpp for problem 1. P2.cpp for problem 2, and so on.
5. Put all submission files to a single tar file.
 - a. Use a proper compression utility (with a proper setting)
6. Submit the program through the designated system.

The designated system is **autolab.en.kku.ac.th**

Version Policy:

A student can submit as many as please. However, version(s) beyond version 5 will be penalized 5% for each excessive version.

The system will allow submission until 16:15, but a late submission after 16:00 will be penalized 10%.

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P1. Output.

Write a program to print out “TRUST” on the screen. The program takes no input.

Output example:

```
TRUST
```

P2. Input.

Write a program to take 2 inputs from a user: name and age. Then display the information as follows:

Output example, when a user puts in Namtarn and 25 respectively.

```
Name: Namtarn
Age: 25
25 years ago, Namtarn was born.
```

The **bold font** indicates input. Fonts are used only to emphasize a user input. The program is not expected to produce any of these font effects.

[Hint: declare

```
string myString;
```

To get a string variable to store text data.]

P3. Expression.

Write a program that gets 2 integers and stores into x and y respectively. Then find a real number value of $z = 3x / 4y$

Output example: when inputting 6 and 8 respectively via keyboard

```
Enter 2 integers: 6 8
z = 0.5625
```

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P4. Flow rate.

Write a program to calculate a flow rate (liter/second) from a volume of liquid flowing through a pipe and being accumulated for one minute. The program asks a user for a volume of liquid (in liter) accumulated for one minute.

Have the program interact exactly like what shown in the example. Volume is an input, which has to be obtained from a user.

[Hint: $\text{flow rate} = \text{volume}/\text{time}$ and $1 \text{ minute} = 60 \text{ seconds}$.]

Output example: when inputting the volume as 2.4

```
Volume: 2.4  
Flow: 0.04
```

P5. Child height.

Write a program to take the height of a child in cm. Then determine whether a child can play a ride. If the child is at least 120 cm high, the child can play. If not, the child cannot play.

Output example 1, when a user puts in 150.

```
Height: 150  
Can play
```

Output example 2, when a user puts in 110.

```
Height: 110  
Cannot play
```

P6. Monopole.

Write a program to calculate a length of a monopole antenna (L), given a target radio wave frequency (f). The program asks a user for a radio wave frequency (in Hz) and calculates a length (in meter) of a quarter-wave monopole, according to:

$$L = \lambda / 4$$

where L is a length (in meter) of a monopole antenna and λ is a wavelength (in meter).

Note that $c = f \cdot \lambda$ where f is a frequency (in Hz); λ is a wavelength (in meter); and c is a light speed, using 3×10^8 meter/second for c .

Have the program interact exactly like what shown in the example. Frequency (f) is an input, which has to be obtained from a user.

Output example: when inputting the frequency as 2400000

Frequency: 2400000 Length: 31.25
--

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P7. Body temperature.

Write a program to determine the fever level and output a message according to the following table, when a user inputs a body temperature.

Temperature	Message
< 35.0	Hypo
35.0 - 37.5	Normal
37.6 - 40.0	Fever
> 40.0	Doctor!

Output example 1, when a user puts in 36.8.

```
Tmp: 36.8
Normal
```

Output example 2, when a user puts in 32.

```
Tmp: 32
Hypo
```

Output example 3, when a user puts in 50.

```
Tmp: 50
Doctor!
```

Note: provided examples do not include all cases.

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P8. Exam score.

Write a program to calculate your exam score, according to the same policy as this exam as follows.

- If a student submits 5 versions or less, the student will not be penalized.
- Each version exceeding 5 versions will be penalized 5%.

For example,

If a student submits 4 versions, there is no penalty.

If a student submits 5 versions, there is no penalty.

If a student submits 6 versions, there is 5% off penalty. If the total Autolab score is 200, the actual score will be $200 - 5\% = 190$ points.

If a student submits 7 versions, there is 10% off penalty. If the total Autolab score is 200, the actual score will be $200 - 10\% = 180$ points.

If a student submits 8 versions, there is 15% off penalty. If the total Autolab score is 200, the actual score will be $200 - 15\% = 170$ points.

And so on.

Take a raw score and a number of versions as inputs from a user.

Output example 1, when a user puts in 200 and 4 respectively.

```
Raw score: 200  
Version: 4  
Actual score: 200
```

Output example 2, when a user puts in 540 and 8 respectively.

```
Raw score: 540  
Version: 8  
Actual score: 459
```

Output example 3, when a user puts in 600 and 10 respectively.

```
Raw score: 600  
Version: 10  
Actual score: 450
```

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Note: provided examples do not include all cases.

P9. Freight cost.

Write a program to calculate a freight cost. The cost is charged 12 baht/km for a full truckload or 0.02 baht/km per kg for a less-than-truckload freight. See the flowchart below (Figure 1) for clarification.

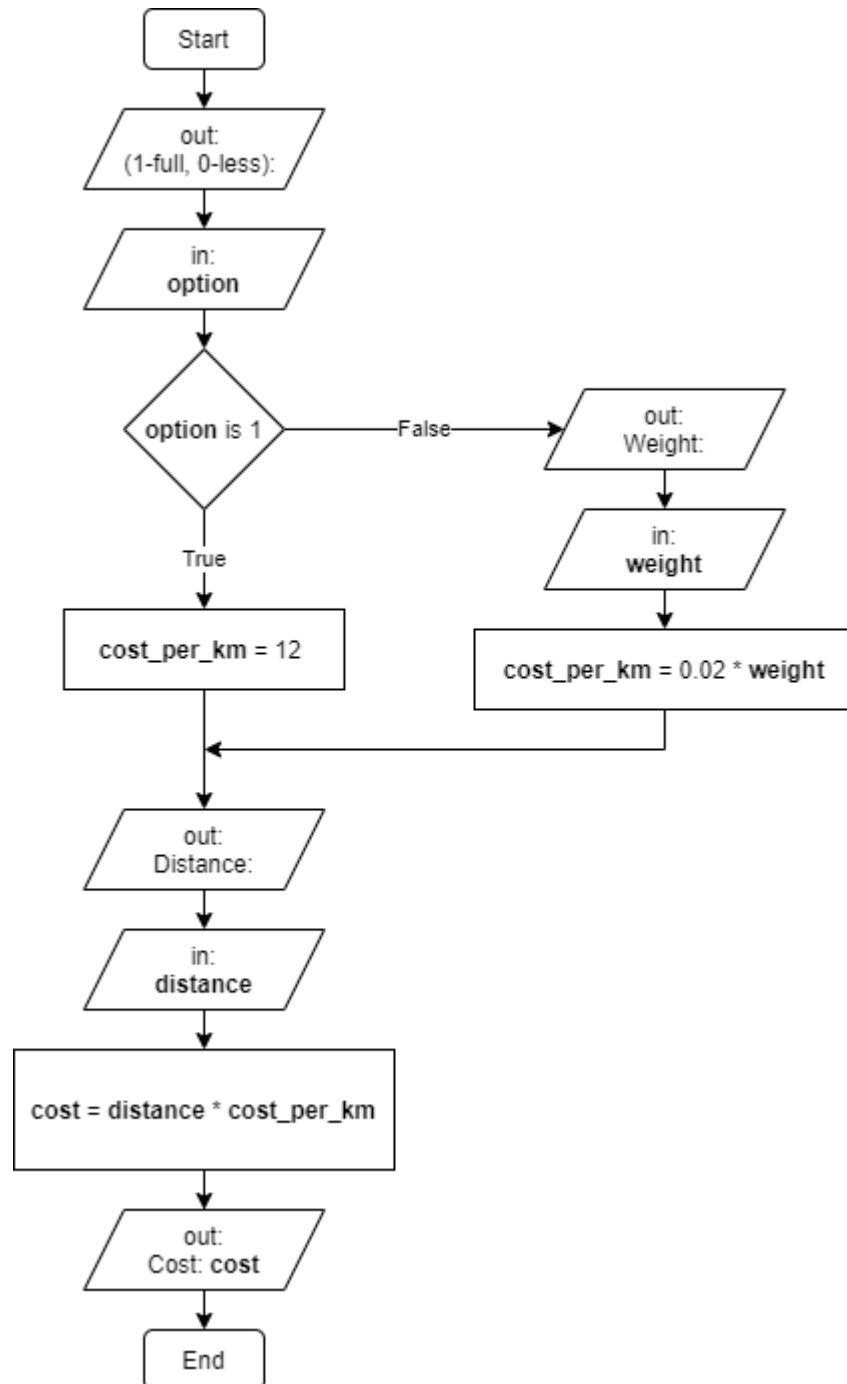


Figure 1. Freight-cost flowchart. Variables are shown in a **bold font**.

The program asks a user if he/she wants to take a full truckload (1) or a less-than-truckload (0). If the user takes a less-than-truckload, ask for a weight of the

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package. Either case the program asks for a distance, then computes a freight cost and reports.

Have the program interact exactly like what shown in the examples. Option, weight, and distance are input, which have to be obtained from a user.

!Caution!: The flowchart shows variables **option**, **weight**, **cost_per_km**, **distance**, and **cost**. It is recommended to declare **option** as an integer and other variables as floating-point numbers.

Output example: when choosing a full truckload with distance of 440 km

```
(1-full, 0-less): 1  
Distance: 440  
Cost: 5280
```

Note: choosing 1 (in the first line) represents choosing a full truckload.

Output example: when choosing a less-than truckload with weight of 50 kg and distance of 440 km

```
(1-full, 0-less): 0  
Weight: 50  
Distance: 440  
Cost: 440
```

Note: choosing 0 (in the first line) represents choosing a less-than truckload.

Output example: when choosing a less-than truckload with weight of 100 kg and distance of 110 km

```
(1-full, 0-less): 0  
Weight: 100  
Distance: 110  
Cost: 220
```

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