University of Vavuniya

First Examination in Information Technology 2021

First Semester - March 2023

IT1134 Fundamentals of Programming (Practical)

Answer All Questions

Time Allowed: Three hours

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1. A pencil manufacturing company is planning to introduce pencils in the shape of hexagonal prisms. Before manufacturing, they like to estimate the materials required to make pencils. The design of the pencil has a hexagonal shape as shown in Figure 1. Pencils will be made of wood and carbon stick. To make their calculation easier, you are requested to write a C++ program with the following tasks:

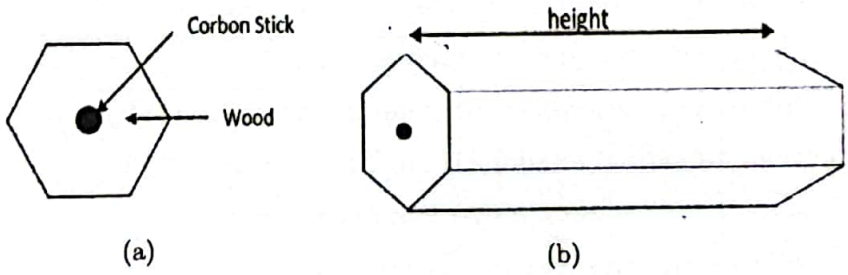

Figure 1: A hexagonal shape of a pencil in (a) a cross-section face, and (b) a 3D shape.

[*This question is continued on the next page*]

Tasks:

(a) Get the details of one of the side lengths of the hexagon, the height of the pencil, and the diameter of the carbon stick from the user (All the measurements are in centimeters).

(b) Write a function to calculate the area of the hexagonal surface.

(c) Write a function to calculate the area of the rectangles.

(d) Write a function to find the volume of the carbon stick.

(e) Write a function to find the volume of the hexagonal prism.

(f) Find the total required wood to make a pencil.

(g) To make the pencils more attractive, company planned to wrap the pencils with shinning sheets. find the required shinning sheet to wrap a pencil (Assume that the pencil should be fully covered).
(Hint: Area of the hexagon is $\frac{3\sqrt{3}}{2}a^2$; where a is the length of the side of a regular hexagon. Volume of the prism = cross surface area x height. Area of the circle $\pi(\frac{d}{2})^2$; where $\pi = 3.14$ and d is diameter)

Sample input and output:

```
Enter the length of the pencil:3
Enter the height of the pencil:6
Enter the diameter of the carbon stick:1
Area of the hexagonal surface is 23.3827
Area of the rectangle surface 18
Volume of the carbon stick is 4.71
Volume of the hexagonal prism is 140.296
Total need of wood to make a pencil:135.586
Total need of shining sheet:154.765
```

[40%]

2. You are required to write a C++ program to read an even integer from the user and display the number as a summation of two prime numbers.

Sample input and output:

```
Enter an integer number:  10
Summation of prime pairs:
3+7
5+5
```

[20%]

3. Eight persons attended a competitive examination for a government job vacancy and obtained a score in each stage with credits are shown in Figure 2. To pass the examination, they have to score a minimum of 3.3 on average of 9 stages. For finding the average score, the obtained score of each stage and the credit value of each stage will be multiplied and added together, and divided by the sum of the credit value. (Average Score=$\frac{C1*S1+C2*S2+C3*S3+...+C9*S9}{S1+S2+S3+....+S9}$, where C1,C2,C3,. . . .C9 are credit values of the stages and S1,S2,. . . .,S9 are scores obtained in each stages)

	Stage 1 (2 Credit)	Stage 2 (3 Credit)	Stage 3 (1 Credit)	Stage 4 (6 Credit)	Stage 5 (2 Credit)	Stage 6 (3 Credit)	Stage 7 (1 Credit)	Stage 8 (4 Credit)	Stage 9 (2 Credit)
Person 1	3.7	4.0	3.3	3.0	2.7	2.0	2.3	4.0	3.0
Person 2	2.3	3.1	1.9	2.2	3.6	3.8	3.65	2.85	2.6
Person 3	2.0	2.4	3.5	3.7	2.9	3.3	2.85	1.5	1.6
Person 4	3.2	3.1	3.3	2.9	2.4	2.5	4.0	1.99	2.35
Person 5	3.6	2.8	3.4	3.3	3.1	2.9	2.4	3.2	2.95
Person 6	4.0	3.6	3.8	3.7	2.8	3.4	2.95	2.9	2.74
Person 7	3.8	2.6	2.7	3.2	3.5	3.7	3.7	2.8	2.5
Person 8	3.25	3.85	2.7	1.8	2.8	2.8	3.4	3.3	2.8

Figure 2: Persons obtained scores in various stages for a government competitive examination.

[*This question is continued on the next page*]

(a) Find the multiplication of scores with the respective credit values.

(b) Find the total credits of all the stages.

(c) Find the average scores of all persons.

(d) Arrange and display the persons in descending order based on the average score.

(e) Display the persons who are qualified for the job. [40%]