

ECE 71/191T – Data Structures and Algorithms

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C++ Homework Assignment: Chapter 5

Code Due By: Midnight on Wed, Jan 25

Write-up Due By: Class on Thu, Jan 26

HOMEWORK #9 – Conical Paper Cup

You have been given the contract for making little conical cups that come with bottled water. These cups are to be made from a circular waxed paper of 4 inches in radius by removing a sector of arc-length x . by closing the remaining part of the circle, a conical cup can be made. Your objective is to remove the sector so that the volume of the cup can be maximized.

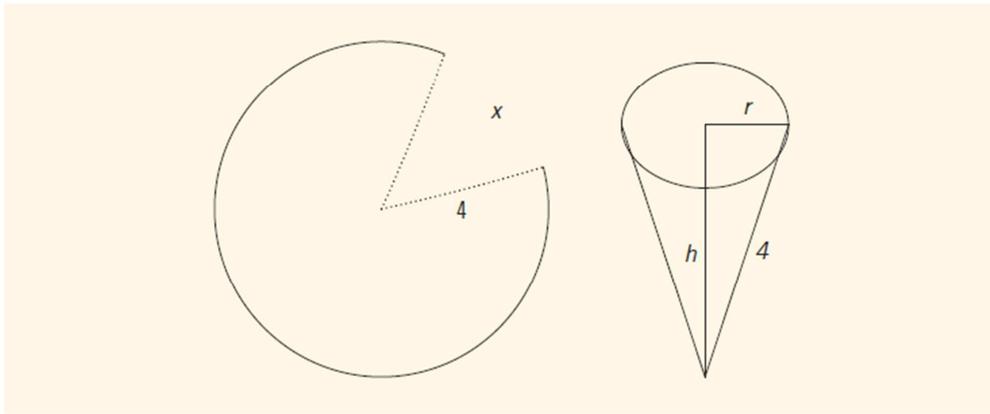


FIGURE 5-4 Conical paper cup

Specifications:

Write a program that prompts the user to enter the radius of the circular waxed paper in inches. The program should then output the length of the removed sector that maximizes the volume, in addition to the volume of the conical cup. Calculate your answer to two decimal places.

Use a named constant value of 3.141592654 for π .

```
Please enter the radius of the circular waxed paper: 5.3
```

```
Using circular waxed paper with a radius of 5.30 in,  
the length of the removed sector should be 6.11 in.  
The maximum volume will then be 60.01 in^3.
```

Once you verify the operation of your program, submit your source code to the Grader Program.

HOMEWORK #8 – Apartment Profit Problem

A real estate office handles a number of apartment units. Up to a certain rental cost (per apartment), all units are occupied. However, every time the rent is increased by a certain amount, one unit becomes vacant. Additionally, each occupied unit requires an average maintenance cost per month. How many units should be rented to maximize the profit?

Specifications:

Write a program that prompts the user to enter:

1. The total number of rentable units.
2. The maximum rental cost that will ensure all units are occupied.
3. The increased rental cost that results in a vacant unit.
4. The maintenance costs per month of a rented unit.

The program should then output the number of units to be rented to maximize the profit, along with the maximum profit.

HINT: Lookup how to use the `put_money()` function, which is part of the STL library. The function accepts numerical values in cents.

```
Enter the number of apartments: 50
Enter the rent for each apartment: $600.00
Enter the rent increase that leads to a vacant unit: $40.00
Enter the maintenance costs for each rented apartment: $27.00
```

```
The monthly rent should be set to $1,320.00.
The maximum number of units to be rented is 32.
The maximum profit is $41,376.00.
```

Once you verify the operation of your program, submit your source code to the Grader Program.