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Sub: Data Structure
HW: 01

Problem: Calculate The Bottom Area, volume and Surface Area of a cylinder.

Solution:

```cpp
#include <bits/stdc++.h>
using namespace std;

class Cylinder
{
private:
    double radius;
    double height;

public:
    // Constructor
    Cylinder(double r, double h) : radius(r), height(h) {}
    const double PI = 3.1416;

    // Function to calculate bottom (base) area
    double bottomArea()
    {
        return PI * radius * radius;
    }
    // Function to calculate volume
    double volume()
    {
        return bottomArea() * height;
    }
    // Function to calculate surface area
    double surfaceArea()
    {
        return 2 * PI * radius * (radius + height);
    }
};
int main()
{
    double radius, height;
    // Input radius and height
    cout << "Enter radius: " << endl;
    cin >> radius;
    cout << "Enter height: " << endl;
    cin >> height;
    // Create a Cylinder object
    Cylinder cyl(radius, height);
    // Output results
    cout << "Radius Of Cylinder: " << radius << ", Height Of Cylinder: " << height << endl;
    cout << "Bottom Area: " << cyl.bottomArea() << endl;
    cout << "Volume: " << cyl.volume() << endl;
    cout << "Surface Area: " << cyl.surfaceArea() << endl;

    return 0;
}
```

```
// Input Text
Enter Radius: 4
Enter Height: 5

//Output
Enter radius:
Enter height:
Radius Of Cylinder: 4, Height Of Cylinder: 5
Bottom Area: 50.2656
Volume: 251.328
Surface Area: 226.195
```

Cylender.cpp | input.txt

Cylender.cpp > ...

```cpp
#include <bits/stdc++.h>
using namespace std;

class Cylinder
{
private:
    double radius;
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public:
    // Constructor
    Cylinder(double r, double h) : radius(r), height(h) {}
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    // Function to calculate bottom (base) area
    double bottomArea()
    {
        return PI * radius * radius;
    }

    // Function to calculate volume
    double volume()
    {
        return bottomArea() * height;
    }

    // Function to calculate surface area
    double surfaceArea()
    {
        return 2 * PI * radius * (radius + height);
    }
};

int main()
{
    double radius, height;

    // Input radius and height
    cout << "Enter radius: " << endl;
    cin >> radius;
    cout << "Enter height: " << endl;
    cin >> height;

    // Create a Cylinder object
    Cylinder cyl(radius, height);

    // Output results
    cout << "Radius Of Cylinder: " << radius << ", Height Of Cylinder: " << height << endl;
    cout << "Bottom Area: " << cyl.bottomArea() << endl;
    cout << "Volume: " << cyl.volume() << endl;
    cout << "Surface Area: " << cyl.surfaceArea() << endl;

    return 0;
}
```

input.txt

```
4 5
```

output.txt

```
Enter radius:
Enter height:
Radius Of Cylinder: 4, Height Of Cylinder: 5
Bottom Area: 50.2656
Volume: 251.328
Surface Area: 226.195

```