Exercise 1:

Create two classes “Admin” and “Academic” and make all data private in these classes. Descriptions for these classes are provided below.

<table>
<thead>
<tr>
<th>Admin</th>
<th>Academic</th>
</tr>
</thead>
<tbody>
<tr>
<td>- School: String</td>
<td>- School: String</td>
</tr>
<tr>
<td>- Years of service: int</td>
<td>- Years of service: int</td>
</tr>
<tr>
<td>- Room number: String</td>
<td>- Room number: String</td>
</tr>
<tr>
<td>- Phone number: String</td>
<td>- Phone number: String</td>
</tr>
<tr>
<td>+ Admin(String, int, String, String)</td>
<td>+ Academic(String, int, String, String, String)</td>
</tr>
<tr>
<td>+ Print()</td>
<td>+ Print()</td>
</tr>
</tbody>
</table>

Write a new class Employee that inherits from person and has those features that are common to Admin and Academic. Then make Academic and Admin inherit from Employee. Create the following structure:

```
Person
   ▲
Employee
    ▲
Admin
    ▲
Academic
```

Given the inheritance structure above, make the data private in all classes and use the inherited print methods to print the super class’ data from the subclasses. Now, modify the print methods to directly access the data and note the compile errors you get. Then modify the appropriate super classes so that they make their data protected. Comment on any potential problems of making the data protected rather than private.

Exercise 2:

Write a class called Point. It will contain two data members of type double to hold the x and y coordinates of the point. It should also contain the following function members:
• The constructor will take two double parameters that are used to initialize the x and y coordinates
• A function called resetValues that takes two parameters and sets the x and y coordinates
• A function called getX that returns the value of the x coordinate.
• A function called getY that returns the value of the y coordinate.

Now write a class called Circle. It will inherit the class Point and have one double data member for the radius. The following member functions should also be written.

• The constructor will take three double parameters. One of those will be the radius of the circle and the other two are used to initialize the x and y coordinates representing the center of the circle.
• A function called resetRadius that takes one parameter and sets the radius
• A function called getRadius that returns the radius of the circle.
• A function called getArea that calculates and returns the area of a circle (PI * radius * radius). You will use PI = 3.14.

Lastly, write a class called Cylinder. This class will inherit the class Circle. It will have a data member of type double to hold the height. It will also contain the following member functions.

• The constructor should take four double parameters. One will represent the height of the cylinder and the other three will represent the radius, x, and y coordinates and should be passed on to the circle constructor.
• A function called resetHeight that takes one parameter and sets the height.
• A function called getHeight that returns the height of the cylinder
• A function called getVolume that calculates and returns the volume of the cylinder (circleArea * height)

**Exercise 3:**

```
Shape
   /\  \
TwoDimensionShape ThreeDimensionShape
  /\  \
Square  Circle  Cube  Sphere
```

Complete each class by the appropriate attributes and methods and implement the previous inheritance structure.