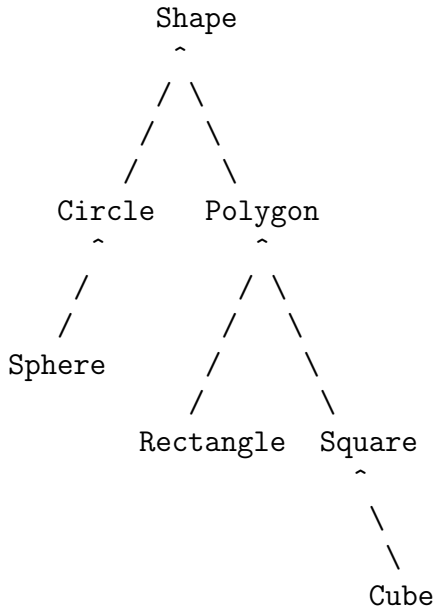
CS 351 Programming Languages
FALL 2015
Individual Programming Project

Specification for program to be written in C++

The C++ program is to implement inheritance and virtual functions. The inheritance is shown below.



You have to define one class for each shape, and use public inheritance when deriving from base classes. Each class should contain the following attributes and member functions.

```
Circle
   int r;
   void area();
   void perimeter();
   void volume();
Sphere
   int r;
   void area();
   void perimeter();
   void volume();
Rectangle
   int length, width;
```

```
   void area();
   void perimeter();
   void volume();
Square
   int length;
   void area();
   void perimeter();
   void volume();
Cube
   int length;
   void area();
   void perimeter();
   void volume();
```

Function area(), perimeter, and volume() are virtual functions inherited from Shape class. Define the Shape class and the Polygon class as abstract classes. All other classes should inherit the virtual functions from its base class and override. Some functions are not defined for certain shapes. For instance, volume is not defined for Circle; your program must display a warning message in the overriden function *"Volume not defined for circle"*.

Include proper constructors for each concrete class. Use the appropriate formulae to calculate areas, perimeters and volumes. Display messages for each calulation.