Homework

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Point←Circle←Cylinder

The base class, **Point**, includes the two fields, **x** and **y**, with a constructor, accessors (**getX()**, **getY()**), a mutator (**move()**) and **toString()**.

Create two derived classes, **Circle** and **Cylinder**. Place both definitions in the same header file and the member functions for both classes in the same implementation file.

- Create a derived class from **Point** named **Circle**
  - → Add only one data member, **radius**.
  - → Add a working constructor that takes **radius**, **x** and **y** as arguments
  - → Do not add a default constructor.
  - → Add accessors **getRadius()**, **getArea()** and **getCircumference()**
  - → Add an overridden version of the **toString()** method.
- Create a derived class from **Circle** named **Cylinder**
  - → It also will add only one additional field (**height**).
  - → Its constructor will take the arguments **height**, **radius**, **x** and **y**
  - → Do not add a default constructor
  - → Add accessors **getHeight()**, **getVolume()**.
  - → Override **getArea()** to return the total surface area of the cylinder
  - → Override **toString()** as described below.

The *toString()* Virtual Function

The **toString()** member function takes a **decimals** argument that defaults to **2**. Look at **Point** to see how it works. Call **Point::toString()** in your **Circle::toString()** and **Cylinder::toString()** member functions.

The output from **Circle::toString()** should look like this:

```
Circle(radius=20.00, center=Point(150.00, 135.00))
```

The output from **`Cylinder::toString()`** should look like this (all on one line)

```
Cylinder(height=15.00, base=Circle(radius=20.00,
   center=Point(150.00, 135.00)))
```

The header file contains a definition for **`PI`** that you should use in calculating the area, circumference and volume.

Use **`make test`** to test your code, **`make stest`** or **`make run`** to run any student tests. Once your score is OK, use **`make submit`** to turn it in.

If you get stuck, ask for help on Piazza, or come by my office hours (early!!!).