Lab2

9. Circle Class

Write a Circle class that has the following member variables:
• radius: a double
• pi: a double initialized with the value 3.14159
The class should have the following member functions:
• **Default Constructor.** A default constructor that sets radius to 0.0.
• **Constructor.** Accepts the radius of the circle as an argument.
• **setRadius**. A mutator function for the radius variable.
• **getRadius**. An accessor function for the radius variable.
• **getArea**. Returns the area of the circle, which is calculated as
area = pi * radius * radius
• **getDiameter**. Returns the diameter of the circle, which is calculated as
diameter = radius * 2
• **getCircumference**. Returns the circumference of the circle, which is
calculated as
circumference = 2 * pi * radius
Write a program that demonstrates the Circle class by asking the user for the
circle's
radius, creating a Circle object, and then reporting the circle's area, diameter,
and
circumference.

10. Population

In a population, the birth rate and death rate are calculated as follows:
Birth Rate = Number of Births ÷ Population
Death Rate = Number of Deaths ÷ Population
For example, in a population of 100,000 that has 8,000 births and 6,000 deaths
per
year, the birth rate and death rate are:
Birth Rate = 8,000 ÷ 100,000 = 0.08
Death Rate = 6,000 ÷ 100,000 = 0.06

Design a Population class that stores a population, number of births, and
number of
deaths for a period of time. Member functions should return the birth rate and
death
rate. Implement the class in a program.
*Input Validation: Do not accept population figures less than 1 , or birth or
death numbers less than 0.*

14. Freezing and Boiling Points

The following table lists the freezing and boiling points of several substances.

Substance	Freezing Point	Boiling Point
Ethyl Alcohol	–173	172
Oxygen	–362	–306
Water	32	212

Design a class that stores a temperature in a temperature member variable and has
the appropriate accessor and mutator functions. In addition to appropriate constructors, the
class should have the following member functions:
• **isEthylFreezing.** This function should return the bool value true if the temperature stored in
the temperature field is at or below the freezing point of ethyl
alcohol. Otherwise, the function should return false.
• **isEthylBoiling.** This function should return the bool value true if the temperature stored in
the temperature field is at or above the boiling point of ethyl
alcohol. Otherwise, the function should return false.
• **isOxygenFreezing.** This function should return the bool value true if the temperature stored
in the temperature field is at or below the freezing point of oxygen. Otherwise, the function
should return false.
• **isOxygenBoiling.** This function should return the bool value true if the temperature stored
in the temperature field is at or above the boiling point of oxygen. Otherwise, the function
should return false.
• **isWaterFreezing.** This function should return the bool value true if the temperature stored
in the temperature field is at or below the freezing point of
water. Otherwise, the function should return false.
• **isWaterBoiling.** This function should return the bool value true if the temperature stored in
the temperature field is at or above the boiling point of water.
Otherwise, the function should return false.
Write a program that demonstrates the class. The program should ask the user to
enter a temperature, and then display a list of the substances that will freeze at that
temperature and those that will boil at that temperature. For example, if the temperature is -20
the class should report that water will freeze and oxygen will boil at that
temperature.