

Homework 6

All the following assignments are selected from Gaddis edition 7. The purpose is that you practice with **classes**. First do the reading assignment; Sections 7.14-7-15 (pages 449-464). Run your code, submit the output and code too. Submit code in a separate, compliable file, do NOT include it in your pdf or text file.

1. Programming challenges 7.10, Report Heading, page 480. [1 point]
2. Programming challenges 7.13, Population, page 481. [2 points]
3. Programming challenges 7.14, Gratuity Calculator, page 481. [1 point]

10. Report Heading

Design a class called `Heading` that has data members to hold the company name and the report name. A two-parameter default constructor should allow these to be specified at the time a new `Heading` object is created. If the user creates a `Heading` object without passing any arguments, “ABC Industries” should be used as a default value for the company name and “Report” should be used as a default for the report name. The class should have member functions to print a heading in either one-line format, as shown here:

```
Pet Pals Payroll Report
```

or in four-line “boxed” format, as shown here:

```
*****
      Pet Pals
    Payroll Report
*****
```

Try to figure out a way to center the headings on the screen, based on their lengths. Demonstrate the class by writing a simple program that uses it.

13. Population

In a population, the birth rate and death rate are calculated as follows:

Birth Rate = Number of Births \div Population

Death Rate = Number of Deaths \div Population

For example, in a population of 100,000 that has 8,000 births and 6,000 deaths per year,

Birth Rate = $8,000 \div 100,000 = 0.08$

Death Rate = $6,000 \div 100,000 = 0.06$

Design a `Population` class that stores a current population, annual number of births, and annual number of deaths for some geographic area. The class should allow these three values to be set in either of two ways: by passing arguments to a three-parameter constructor when a new `Population` object is created or by calling the `setPopulation`, `setBirths`, and `setDeaths` class member functions. The class should also have `getBirthRate` and `getDeathRate` functions that compute and return the birth and death rates. Write a short program that uses the `Population` class and illustrates its capabilities.

Input Validation: If a population figure less than 2 is passed to the class, use a default value of 2. If a birth or death figure less than 0 is passed in, use a default value of 0.

14. Gratuity Calculator

Design a `Tips` class that calculates the gratuity on a restaurant meal. Its only class member variable, `taxRate`, should be set by a one-parameter constructor to whatever rate is passed to it when a `Tips` object is created. If no argument is passed, a default tax rate of .065 should be used. The class should have just one public function, `computeTip`. This function needs to accept two arguments, the total bill amount and the tip rate. It should use this information to compute the meal cost before any tax was added. It should then apply the tip rate to just the meal cost portion of the bill to compute and return the tip amount. Demonstrate the class by creating a program that creates a single `Tips` object, then loops multiple times to allow the program user to retrieve the correct tip amount using various bill totals and desired tip rates.

Input Validation: If a tax rate of less than 0 is passed to the constructor, use the default rate of .065. Do not allow the total bill or the tip rate to be less than 0.