

Programming Exercise 9.7 p.361 (The Account class)

Design a class named **Account** that contains:

- A private **int** data field named **id** for the account (default 0).
- A private **double** data field named **balance** for the account (default 0).
- A private **double** data field named **annualInterestRate** that stores the current interest rate (default 0). Assume all accounts have the same interest rate.
- A private **Date** data field named **dateCreated** that stores the date when the account was created.
- A no-arg constructor that creates a default account.
- A constructor that creates an account with the specified id and initial balance.
- The accessor and mutator methods for **id**, **balance**, and **annualInterestRate**.
- The accessor method for **dateCreated**.
- A method named **getMonthlyInterestRate()** that returns the monthly interest rate.
- A method named **getMonthlyInterest()** that returns the monthly interest.
- A method named **withdraw** that withdraws a specified amount from the account.
- A method named **deposit** that deposits a specified amount to the account.

Draw the UML diagram for the class and then implement the class. (Hint: The method **getMonthlyInterest()** is to return monthly interest, not the interest rate. Monthly interest is $\text{balance} * \text{monthlyInterestRate}$. $\text{monthlyInterestRate}$ is $\text{annualInterestRate} / 12$.)

Note that **annualInterestRate** is a percentage, e.g., like 4.5%. You need to divide it by 100.)

Write a test program that creates an Account object with an account ID of 1122, a balance of \$20,000, and an annual interest rate of 4.5%. Use the withdraw method to withdraw \$2,500, use the deposit method to deposit \$3,000, and print the balance, the monthly interest, and the date when this account was created.

Programming Exercise 9.9 p.362 (Geometry: n-sided regular polygon)

In an n-sided regular polygon, all sides have the same length and all angles have the same degree (i.e., the polygon is both equilateral and equiangular). Design a class named **RegularPolygon** that contains:

- A private int data field named n that defines the number of sides in the polygon with default value 3.
- A private double data field named side that stores the length of the side with default value 1.
- A private double data field named x that defines the x-coordinate of the polygon's center with default value 0.
- A private double data field named y that defines the y-coordinate of the polygon's center with default value 0.
- A no-arg constructor that creates a regular polygon with default values.
- A constructor that creates a regular polygon with the specified number of sides and length of side, centered at (0, 0).
- A constructor that creates a regular polygon with the specified number of sides, length of side, and x- and y-coordinates.
- The accessor and mutator methods for all data fields.
- The method getPerimeter() that returns the perimeter of the polygon.
- The method getArea() that returns the area of the polygon. The formula for computing the area of a regular polygon is

$$Area = \frac{n \times s^2}{4 \times \tan\left(\frac{\pi}{n}\right)}$$

Draw the UML diagram for the class and then implement the class. Write a test program that creates three RegularPolygon objects, created using the no-arg constructor, using RegularPolygon(6, 4), and using RegularPolygon(10, 4, 5.6, 7.8). For each object, display its perimeter and area.

n=number of side , ex. 10 size=length of each side, ex. 4 x-coordinate = 5.6 y-coordinate=7.8
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