Lab-05 Extra

Inheritance and Polymorphism

For this assignment, you will be writing software in support of a Dessert Shoppe which sells candy by the pound, cookies by the dozen, ice cream, and sundaes (ice cream with a topping). Your software will be used for the checkout system.

To do this, you will implement an inheritance hierarchy of classes derived from a **DessertItem** *abstract* superclass.

The **Candy**, **Cookie**, and **IceCream** classes will be derived from the **DessertItem** class.

The **Sundae** class will be derived from the **IceCream** class.

You will also write a **Checkout** class which maintains a list of **DessertItem's**.

The DessertItem Class

The **DessertItem** class is an *abstract superclass* from which specific types of **DessertItems** can be derived. It contains only one data member, a name. It also defines a number of methods. All of the **DessertItem** class methods except the **getCost()** method are defined in a generic way in the file, **DessertItem.java**, provided for you along with the other specific files in the directory. The **getCost()** method is an *abstract method* that is not defined in the **DessertItem** class because the method of determining the costs varies based on the type of item. Tax amounts should be rounded to the nearest cent. For example, the calculating the tax on a food item with a cost of 199 cents with a tax rate of 2.0% should be 4 cents.

DO NOT CHANGE THE DessertItem.java file! Your code must work with this class as it is provided.

The DessertShoppe Class

The **DessertShoppe class** is also provided for you in the file, **DessertShoppe.java**. It contains constants such as the tax rate as well the name of the store, the maximum size of an item name and the width used to display the costs of the items on the receipt. Your code should use these constants wherever necessary! The DessertShoppe class also contains the **cents2dollarsAndCents** method which takes an integer number of cents and returns it as a String formatted in dollars and cents. For example, 105 cents would be returned as "1.05".

DO NOT CHANGE THE DessertShoppe.java file! Your code must work with this class as it is provided.

The Derived Classes

All of the classes which are derived from the **DessertItem** class must define a constructor. Please see the provided **TestCheckout** class,TestCheckout.java , to determine the parameters for the various constructors. Each derived class should be implemented by creating a file with the correct name, eg., **Candy.java**.

The **Candy** class should be derived from the **DessertItem** class. A **Candy** item has a *weight* and a *price per pound* which are used to determine its *cost*. For example, 2.30 lbs.of fudge @ .89 /lb. = 205 cents. The cost should be rounded to the nearest cent.

The **Cookie** class should be derived from the **DessertItem** class. A **Cookie** item has a *number* and a *price per dozen* which are used to determine its *cost*. For example, 4 cookies @ 399 cents /dz. = 133 cents. The cost should be rounded to the nearest cent.

The **IceCream** class should be derived from the **DessertItem** class. An **IceCream** item simply has a *cost*.

The **Sundae** class should be derived from the **IceCream** class. The *cost* of a Sundae is the *cost of the IceCream* plus the *cost of the topping*.

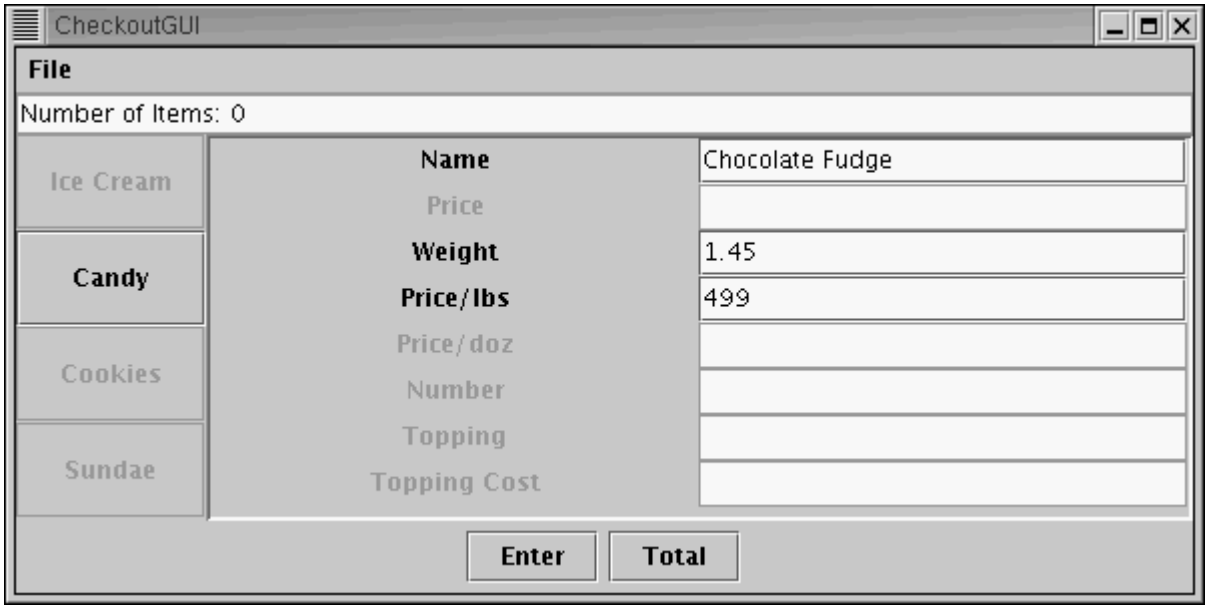
The Checkout Class

The **Checkout** class, provides methods to enter dessert items into the cash register, clear the cash register, get the number of items, get the total cost of the items (before tax), get the total tax for the items, and get a String representing a receipt for the dessert items. The **Checkout** class must use an ArrayList to store the DessertItem's. The total tax should be rounded to the nearest cent. The complete specifications for the **Checkout** class are provided for you in JavaDoc format.

Testing

A simple testdriver, TestCheckout.java along with its expected output, are provided for you to test your class implementations. You can add additional tests to the driver to more thoroughly test your code. A GUI based driver, CheckoutGUI.java, is also available for testing. **Your code must compile and run with both the TestCheckout and CheckoutGUI classes!**

The CheckoutGUI looks like this:



It allows a user to press a button to enter the type of the DessertItem. The appropriate text fields are then enabled so that the user can enter the name and other information for the item. ***All monetary amounts must be entered as an integer number of cents, ie., 100 instead of 1.00.*** Pressing the **Enter** button enters the item into the cash register. Pressing the **Total** button displays a receipt and clears the cash register in preparation for the next transaction.
