JAV745 Fall 2019: Lab 3 - (4%)

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Fall 2019

Due Tuesday October 15, 2019 - 11:30 pm

Instructions

Please read the instructions carefully and follow the naming conventions specified for each question. Solutions must be submitted in the Blackboard Dropbox created for Lab 3.

Note that the deadline is strictly enforced. The system tracks the exact time that submissions are uploaded. **There is a 10% per day penalty for late submissions.**

Additional Notes

- You may use any IDE for development but note that demonstrations and professor testing will be done exclusively on the command line. Ensure that you test your programs on the command line before submission.
- ensure that your programs are documented using *JavaDoc* standards

Question Descriptions

Question 1) Consider a billing system containing the following entities.

- a simple good, one that has price.
- a good that is sold by weight, so its attributes are its weight (in kgs), and its price per kg.
- a good that is stored in bunches. Its attributes are the number of units in the bunch (no partial units are allowed) and the cost per unit.

All goods have a numeric UPC (Universal Product Code) and a name

Services can also be purchased.

- a service that is charged at an hourly rate
- a service that has a flat fee

All services have a name and an description.

Both good and hourly rate services are taxable (flat fee services are not taxed), the rate depends on the province where the business is taking place.

Province	Code	Goods Rate	Hourly Services Rate
Alberta	AB	3%	5%
Ontario	ON	5%	6%
British Columbia	BC	9%	9%
Quebec	QC	8%	7%

All goods and services objects must have a method which gets the object's name, object's price before tax, one which indicates whether the product is taxed and one which gives the price after tax.

Deliverables

(a) Create a class hierarchy which can be used to respresent the system described. Use concepts discussed in class to reduce code duplication, accurately model the system's data and to ensure type safety. Create your class hierarchy in a UML class diagram using a UML-compliant tool. **Export the diagram from the tool and submit in pdf format**.

(b) Implement your model in Java. **Submit the set of source files generated**. DO NOT zip the files! Only the source is required. Do not submit bytecode or IDE project files.

(c) Write an application using the classes created below in an application class called *Cashier* which can generate a bill of sale for a customer. Upon startup, the user provides the province code where the store is located for taxation purposes. The following items can purchased.

- garden hose (UPC code 0001), $4.99
- grass seed (UPC code 0002), $0.35 per kg
- nails (UPC code 0003), $.02 per nail....sold in packages of 50 or 90
- lawn cutting service, $100
- professional interlock laying $44 per hour

The program should ask the user to individually enter the item to be purchased and the quantity of that item. Only the items above can be purchased. You can assume that a maximum of 50 items can be in a transaction so there is no need to ask the user how many items they are purchasing. **All the items must be stored in a single array of size 50**.

Once the user has entered all the items, then a bill of sale is printed to the console. It must include the following data.

- For each item purchased it should display the following item name, quantity purchased, price before tax, price after tax. Each item should appear on a separate line
- The final line should have the total price.

Submit the source file generated