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| CS1101 Lab 16– **3rd Comprehensive Lab** |

**Released on: November 22, 2017** **Due on: December 8, 2017** by the end of the day (11:59 p.m.)

**How:** submit on Piazza in folder lab16 as a zipped file YourLastNameYourFirstName.zip.  
**What:** a zip file named LastNameFirstNameLab16.zip, containing your java files named ToyStoreItem.java, ToyStoreInventory.java, and ManageToyStore.java, along with a word document named LastNameFirstNameLab16.docx

**Note:** You can elect to do this lab in pairs. In this case, you will put both names in the zip file name. If you do this lab in pair, please make sure that as a team, you will never submit any work that is not fully understood or replicable by both members of the team.

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| This lab assignment is about **user-defined types** and **linked lists**. You will also get to practice some on exceptions. At the same time, this will be one more opportunity for you (the last one this semester) to reinforce your knowledge of **arrays, strings, and methods**, as well as **input/output**.  **We hope you have fun completing this assignment!** |

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| As the manager of a toy store, you want to keep track of the items you have in your store. You decide that you need a new Java type: **ToyStoreItem**, and that you might need to handle such information in a linked list, hence the other new type **ToyStoreInventory**. You then proceed to implement methods that you will need to handle your toy store, in the file **ManageToyStore.java**.  You are expected to complete methods as specified below. However, you are also free to add anything you’d like to **make your project more relevant and interesting**. There will be **up to 15 extra points** for projects that demonstrate a high level of relevance to the real life application of a Toy Store and/or creativity. |

You are given three java files. In each of the 3 files provided to you, you will see that not everything has been implemented: there are methods left for you to implement. Here is what you have to do:

**ToyStoreItem.java:**

Follow all instructions and complete all methods in this file, as relevant with respect to the start of the new type provided to you (for instance, you already have the list of all attributes). Areas that require your attention are preceded by “TO DO:”.

**ToyStoreInventory.java:**

This is the new type defining a linked list of Toy Store Items (of type ToyStoreItem). In this file, you can observe that constructors, setters, and getters are already given to you. Feel free to add more constructors as you see fit, but you do not have to.

On the other hand, you see that there are quite a few methods in the category “Other methods” that still need to be completed (still, some are provided to you, like printLL, sizeLL, sizeLLR). Here is the list of the incomplete methods: addTail (2 methods to be completed), removeHead, removeTail, addNth, removeNth. You do not need to complete all of them, but you need to **complete at least 2 of them** (and they cannot be both addTail).

**ManageToyStore.java:**

This is the java file where you are going to use the new types, ToyStoreItem and ToyStoreInventory, in order to handle and manage your toy store. Again, some methods are given to you, but most are incomplete and need your attention. Here is the list of these methods: numItem, readItemsFromFileA, readItemsFromFileLL, sortByRegistrationDate, another sorting method of your choice, revenue (two methods: one for arrays, the other one for linked lists), buildLL, buildA, printItems (two methods: one for arrays, the other one for linked lists), and the main method.

Out of all these methods, you do not need to complete all of them. Here is what you have to do. You actually have two options for the methods you need to implement/complete:

**Option 1/ You need to implement:**

* numToys; readItemsFromFileA; sortByPrice or another sorting method of your choice; revenue (for arrays); buildLL; printToys (for linked lists); an the main method.

**Option 2/ You need to implement:**

* readItemsFromFileLL; sortByPrice or another sorting method of your choice; revenue (for linked lists); buildA; printToys (for arrays); and the main method.

**Exceptions:**

Note: in the above methods, you have to handle exceptions. Throughout this activity, you are expected to handle exceptions at least 2 times, among 2 different types of exceptions.

**What do you have to turn in?**

A zip file named LastNameFirstNameLab16.zip, containing the three updated java files along with a word file named LastNameFirstNameLab16.docx describing how you are using these files that were provided to you in a way that is meaningful. You will have to be clear, detailed, and convincing.

Note: your code is expected to be perfectly indented and documented. In particular, the use of your exceptions should be clearly and fully justified and documented (using comments in the code).

**GRADING CRITERIA**

30% - Information contained in your word document:

* 20% - Correct method descriptions (signatures and bodies)
* 10% - Correct description of what the main method does

60% Code (Java file):

* 30% - Methods’ bodies are a true translation of what is the word file and do what they are expected to
* 5% - The java file ManageToyStore.java compiles and executes properly
* 5% - Appropriate commenting
* 10% - Correct indentation
* 10% - Demo

10% Submission according to specifications

Late submission rules:

You will lose 15% for every 24 hours of lateness, for up to 72 hours. For example, if you submit 36 hours later your maximum percentage is 70%.

**EXTRA-CREDIT OPPORTUNITY: See below!!!**

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**EXTRA-CREDIT OPPORTUNITY**

Change the ToyStoreItem into a SantaWorkshopItem by adding the following attributes:

* name of the child the toy is for;
* age of the child;
* country of the child; and
* continent of the child.

Once you have made those changes in the attributes and modified the constructors, setters, getters, and print methods accordingly, you need to modify:

* the file ToyStoreInventory.java into SantaWorkshop.java: just modify so that the types in the file are consistent with the new type SantaWorkshop; and
* the file ManageToyStore.java into SantaDelivery.java, in which you will implement a method that sort the toys first by continent and then by country, and then by age of the children 🡪 this will create a road map for Santa’s delivery.

This extra-credit opportunity could bring you **up to 20 points!!!**