# Worksheet #1

# CS 249 – Data Structures

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**by**

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1. **True or false?**
   1. All elements of an array must be of the same type.

**True**

* 1. An array index must be an integer.

**True**

* 1. Arrays cannot contain string references as elements.

**False**

* 1. Arrays cannot contain null references as elements.

**False**

* 1. Arrays can use strings as indexes.

**False**

* 1. Parallel arrays must have equal length.

**True**

* 1. Two-dimensional arrays always have the same numbers of rows and columns.

**False**

* 1. Elements of different columns in a two-dimensional array can have different types.

**False**

1. **A. How do you get the first character of a string s?**

char a = s.charAt(0);

**B. The last character?**

char z = s.charAt(-1);

**C. How do you remove the first character?**

String newA = s.substring(1, 5); // new string, first letter removed

**D. The last character?**

String newZ = s.substring(0, 4); // new string, last letter removed

1. **Explain the difference between and object and an object reference.**

An object is a variable assigned to a value using the = operator. And object reference refers to a place in memory at a certain location

1. **Identify the superclass and subclass in each of the following pairs of classes.** 
   1. Employee, Manager

Employee -> Manager //superclass -> subclass

* 1. Polygon, Triangle,

Polygon -> Triangle

* 1. GraduateStudent, Student

Student -> GraduateStudent

* 1. Person, Student

Person -> Student

* 1. BankAccount, CheckingAccount,

BankAccount -> CheckingAccount

* 1. Vehicle, Car

Vehicle -> Car

* 1. Vehicle, Minivan

Vehicle -> Minivan

* 1. Car, Minivan

Car -> Minivan

* 1. Truck, Vehicle

Vehicle -> Truck

1. **Explain the difference between throwing an exception and catching one?**

The throw keyword allows you to throw an exception which will break the execution flow and can be caught in a catch block. When an exception is thrown in a try block, a catch statement can be used to handle the exception or display an error.

1. **What happens if you try to open a file for reading that doesn’t exist? What happens if you try to open a file for writing that doesn’t exist?**

Opening a file to read from Java that doesn’t exist results in an error. However, when opening a file for writing that doesn’t exist, Java will create a new file for you in the default directory.

1. **Consider the following method:**

public static void falseSwap(double a, double b)

{

double temp = a;

a=b;

b=temp;

}

public static void main(String [] args)

{

double x = 3;

double y = 4;

falseSwap(x,y);

System.out.println(x + “ “ + y);

}

**What are the values of x and y printed? Explain why.**

The values printed are still x = 3.0 y = 4.0, the scope of the changes made to the variables passed to the method falseSwap is limited to that function, as they are primitives. The values for the actual variables "x" and "y" do not change in the main program flow.

1. Design a public class that models a bag. Instances of the Bag ADT can have Apple objects inserted (if there is space) and random Apple objects removed (if at least one exist). You may assume an Apple class exists. Your implementation of the Bag ADT must use an array to store its Apple objects. Your design should list all of the member variables of the Bag class as well as all of the signatures (name, return type, and parameters) of each of its methods, including the constructor(s). Hints: The capacity of a bag object is specified through the constructor at the time of its creation. An Apple can only be added if there is space or removed if one exists. Thus, you may use helper methods to determine if there is space to add Apples into the Bag and/or if there is an Apple in the bag to remove.
2. Write Java pseudo-code for each method described in the previous question (i.e., constructor, insert apple into bag, remove random apple, and any helper methods you use).