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**CMP 321 - Programming languages Laboratory**

**Lab 6 –** Python Functions and Lambda Expressions

**Objectives**

* Make use of Python specific features
* Define functions and lambda expressions
* Practice higher order functions

**Please explore and make use of Python features where possible. Code that does not follow this note will be penalized.**

**Exercise 1 :** Java code that converts an array of Fahrenheit temperatures into Celsius

public class TempConvert

{

// function that converts temperature from Fahrenheit to Celsius

public static double convertCelsius(double fahTemp)

{

return ((fahTemp-32)\*(5.0/9.0));

}

public static void main(String []args)

{

//two arrays to store temperature in Fahrenheit and Celsius

double tempFah[]= new double[]{50.45,60.0,75.50,90.0};

double tempCel[]= new double[tempFah.length];

//convert Fahrenheit array into Celsius array

for (int i=0;i<tempFah.length;i++)

tempCel[i]=convertCelsius(tempFah[i]);

//Print the Celsius array

for (int i=0;i<tempCel.length;i++)

System.out.println(tempCel[i]);

}

}

**Part a: Convert the above given Java code into Python.**

1. Define a list that represents a list of temperatures in Fahrenheit.
2. Define a function that converts a temperature from Fahrenheit to Celsius (C=F–32 x 5/9)
3. Use map function to generate a list temperatures in Celsius and print it.

**Part b:**

1. Perform part (a), step 3 using lambda expression
2. Perform part (a), step 3 using list comprehension (i.e. do NOT use map, function or lambda)
3. Calculate the average of temperatures (in Celsius) using reduce
4. Using the lambda expression, return a list that consists of (xi – avg)2 , given that avg is the average in above step 3.
5. Using reduce, calculate the standard deviation by taking the square root of the sum of values generated in above step 4
6. Using the filter function and lambda expression, return a list of negative temperatures (based on list generated in part a, step 3).

**Exercise 2**

The following Java code implements selection sort:

**public** **void** selectionSort(**int**[] arr) {

**int** i, j, minIndex, tmp;

**int** n = arr.length;

**for** (i = 0; i < n - 1; i++) {

            minIndex = i;

**for** (j = i + 1; j < n; j++)

**if** (arr[j] < arr[minIndex])

                        minIndex = j;

**if** (minIndex != i) {

                  tmp = arr[i];

                  arr[i] = arr[minIndex];

                  arr[minIndex] = tmp;

            }

      }

}

1. Perform literal conversion to Python (replace the array with a list).
2. Convert the code to proper Python and make use of its features. Hint:The inner for-loop must be replaced using higher-order functions e.g., map(), reduce() … enumerate().