**Report for explanation**

***Detection of polycyclic aromatic hydrocarbons by fluorescence lifetime measurements***

First of all, I would like to give brief information. We have six different molecules such as Naphtalene Anthracene, Benzopyrène, Pyrene, Chrysene, Benzofluoranthene, and 4 various mixtures. The mixtures called separately mixture 1, mixture 2, mixture 3, and mixture 4. In addition, there are two equations that are different for molecules and mixtures. If our molecule is pure, we use this equation, which is

We use the following equation provided that we have mixtures.

Our goal is to analyze four measurements regard to four various mixtures and find which molecule exists in each molecule and its amount.

As it is seen from the first raw, I used **moduleName** which was **scipy.optimize** and **moduleElement** which was **curve\_fit**. There are certain types of usual modules and one of them is **numpy** which I used in my code and considered **moduleShortName** as a **np**. It is a submodule used for random number generation. I used **import function** to mention this command in my code. Then, I added the **pickle module** by using import command. The pickle module is composed of two classes **Pickler** and **Unpickler** that involve methods to save and load Python data in binary files. Pickler and Unpickler creator takes the binary filename as input.

In physics or chemistry, Python is a beautiful tool to manipulate data that often are stored in a file. As I mentioned before there are some files and they have to be opened. File opening is performed by the **open() function (fileObject= open(fileName, fileType))**. It is obvious from our data that **fileName** is **mixture1.dat**, **mixture2.dat**, **mixture3.dat, mixture4.dat** and **fileType** is **rb**. Afterward, to avoid trouble, I used **with … as …** structure that closes automatically the file if an exception occurs. Furthermore, it has to be mentioned that our variable type was **float** that I wrote at the beginning.

In addition, I also used the **python function definition** which was **def**. **findFluorescenseSum** is the function applied of the object. It is also called a method. Then, I wrote the first equation which was only for molecules. Time is **t**, lifetime is **tau(τ), ampl** is **A**. Next stage is the main one in which I used the **power function(pow)**. In the Homework sheet, Fluorescence lifetime (ns) of each molecule was written and the equation was formed according to this data.

Moving on next stage, there is another python function definition. **findFluorescenseSum** is the function applied of the object. It is also called a method. This stage is for the mixture one. Because it is seen from the second equation, we have to sum all molecules putting each value to our equation.That's why I used list function. Then, we have another python definition function. **myCurveFit** is the function applied of the object. It is also called a method. **Curve fitting** is a type of optimization that finds an optimal set of parameters for a defined function that best fits a given set of observations.

Then, the result has to be displayed. For this, **"print"** function was used. Due to the task, it was not needed to used *conditional statements*, hence I used **loop statements** which was sequence **parcours( for i in (list) : do\_that)**. Because we have some values, and I listed them to get each proportion of molecules in the mixture.

In conclusion, my code is successfully working and show each molecule proportion in the mixture.