Homework 3: Functions in Python

For the following exercises, write your code in one `.py` *file for each problem. Be sure to use a plain text editor (i.e., NOT Word). For parts that require written explanation, use the* `print()` *function to print your answers to the screen when the script is run.*

*Remember that unlike with using the **Python** interpreter, commands will not print out to the screen automatically when run through a scripting file. Wrap each command you'd like to print to the screen in the function* `print()`.

Make sure that you scripts run without error in order to get credit. Do not hesitate to ask for help if needed!

Problem 1 (7 pts)

(a) Define 2 `Python` functions that return respectively $f(x) = \sin(x+2)$ and $g(x) = \frac{10-x^3}{10+2x^3}$;

(b) Define a `Python` function of 3 variables $h(x, y, z) = \cos(x + yz)$;

We will then want to generate data using these functions and write it to a file. More specifically, we want to calculate x, $y = f(x)$, $z = g(x)$, $h(x, y, z)$ for 1001 values of x regularly spaced between 0 and 2π.

Call the data file `data.dat` (we'll usually use `.dat` extensions for data files). It should contain 4 columns, and you'll want to make sure that the numbers are aligned in nice columns (*Hint:* use `format`).

Problem 2   Fibonacci series (8 pts)

We want to write a `Python` script that can compute the *Fibonacci* series, as well as extensions of it. The Fibonacci series is a series of integers such that every element in the series is the sum of the 2 integers coming before it, with the first 2 elements both being equal to 1. Its first 10 elements are:

─────────────── Beginning of the Fibonacci series ───────────────
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 1   1   2   3   5   8   13   21   34   55  ...
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There are multiple ways to accomplish this, but here are the requirements for this problem:

- Your script should contain at least 2 functions:
  - one called `NextElement` that takes 2 numbers as arguments and returns their sum;
  - another called `Add2List` that takes an array `list` and an integer N as arguments, checks that the list contains at least 2 elements, and calls function `NextElement` as needed to add N elements to the provided `list`.
- Your script should ask the user for the values of the first 2 elements of the list and how many elements should be added to the list.
- After adding the elements, the script should print the list.