Report for Assignment 3

Question 1

1. This code is saved in q1.py
2. The program has three instance variables of type: str, int, and float, and then respectively represent the name of the flower, its number of petals, and its price.
   The input is str, int, and float, respectively.
   The output is the name, number of petals, and price of the flower, respectively.
3. Execute as followings:

```
Flower name (string) > str
Number of petals (positive integer) > str
Invalid input, try again.
Number of petals (positive integer) > 1
Flower price (positive float) > 3
Flower name: str
Number of petals: 1
Flower price: 3.0
```

Question 2

1. This code is saved in q2.py
2. The program can turn a polynomial into its derivative form with one arbitrary variable.
   The input is a polynomial in one string.
   The output is the derivative in one string.
3. Execute as followings:

```
Enter an equation > 1+x + 2*x - x^3 - 2*x^3+4*x^5
The derivative is > 1+2-3*x^2-6*x^2+20*x^4
```

Question 3

1. This code is saved in q3.py
2. The program to simulate an ecosystem containing two types of creatures, bears and fish. The ecosystem consists of a river, which is modeled as a relatively large list. Each element of the list should be a Bear object, a Fish object, or None. In each time step, based on a random process, each animal either attempts to move into an adjacent list location or stay where it is. If two animals of the same type are about to collide in the same cell, then they stay where they are, but they create a new instance of that type of animal, which is placed in a random empty (i.e., previously None) location in the list. If a bear and a fish collide, however, then the fish dies (i.e., it disappears).
   The input is str: the length of the river, number of fish, number of bears, and steps in total.
   The output is the circumstances at each step.

3.Execute as followings:

```
Please input the length of the river > 7
Please input the number of the fish > 2
Please input the number of the bears > 2
Please input a valid step > 3
initial river: NFBFNNB
this is river in the 1 step: FNNBNBN
this is river in the 2 step: NFNBNBN
this is river in the 3 step: FBNNBBN
```