Problem 3

I will create a header file and rewrite all sums (for Int, long int, float) in this file. For some reason double datatype did not work so i changed to long int type.

I will create a new file calle series_cpp

```
%%writefile series_cpp.c++

#include<iostream>

extern "C" int int_func(int n)
  {
    int init_s=2;
    int sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }

extern "C" long int long_int_func(int n)
  {
    long int init_s=2;
    long int sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }

extern "C" float float_func(int n)
  {
    float init_s=2.0;
    float sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }
```

```
Overwriting series_cpp.c++
```

Ii will run the following command to load cpp file

```
!cat ./series_cpp.c++
```

```
#include<iostream>

extern "C" int int_func(int n)
  {
    int init_s=2;
    int sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }

extern "C" long int long_int_func(int n)
  {
    long int init_s=2;
    long int sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }

extern "C" float float_func(int n)
  {
    float init_s=2.0;
    float sum = 0;
    for (int i=1; i<n; i++)
      {
        init_s=init_s*init_s;
        sum = sum+init_s;
      }
    return sum;
  }
```

To convert to shared library of python I will run the following commands

```
!gcc  -fPIC -c ./series_cpp.c++ -o ./series_cpp.o -std=c++11
```

```
!gcc -shared ./series_cpp.o -o ./series_cpp.so -lstdc++
```

```
!ls -lah ./series_cpp.*
```

```
-rw-r--r-- 1 compphys compphys  634 Dec  1 02:15 ./series_cpp.c++
-rw-r--r-- 1 compphys compphys 3.0K Dec  1 02:17 ./series_cpp.o
-rwxr-xr-x 1 compphys compphys 8.5K Dec  1 02:17 ./series_cpp.so
```

We will se 3 files as series_cpp.c , series_cpp.o, series_cpp.so in the same directory

Next, to Import them as python library i will use ctypes

```
from ctypes import *
```

```
my_func = cdll.LoadLibrary("./series_cpp.so")
```

Lets test the them with same input values as part 1

```
my_func.int_func(c_int(5))
```

```
65812
```

```
my_func.float_func(c_int(5))
```

```
5
```

```
my_func.long_int_func(c_int(5))
```

```
65812
```

I am not sure why sum for float is getting wrong but other too seems fine.