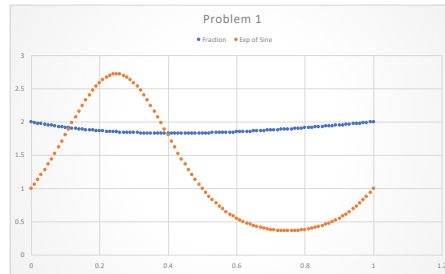# Homework — Week 2:

Please submit a pdf with your code and results.

1. Write a program that prints out, in a nice manner, a table for the functions $f(x) = \dfrac{1+x^2}{1+x} + 1$ and $g(x) = \exp(\sin(2\pi x))$ for x-values between 0 and 1 with a step size of 0.02. You should be able to embed the numbers into a spreadsheet like excel or calc from libre.office. The result and a spreadsheet graph are shown below:
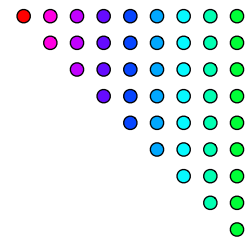
```
0.000, 2.000, 1.000
0.010, 1.990, 1.065
0.020, 1.981, 1.134
0.030, 1.972, 1.206
0.040, 1.963, 1.282
0.050, 1.955, 1.362
0.060, 1.947, 1.445
0.070, 1.939, 1.531
```


2. Write a program that takes a word and changes all vowels to the next vowel (cyclically): a —> e, e —> i, i —> o, o —>u, u —> a.

3. Implement a function that takes a string and then returns the same string without white spaces and punctuation symbols. For example:

```
This is a long, convoluted sentence, isn't it? —>
Thisisalongconvolutedsentenceisntit
```

4. Many important lists are found in Mathematics. On the right, you see the reason for the names.

   1. Create a list of the first 100 triangular numbers. The triangular numbers are 1, 1+2, 1+2+3, 1+2+3+4, 1+2+3+4+5, … . You should use a for loop where you explicitly calculate the addend, which increases by one each time. On the right, you can see the geometric reason behind it.

   2. Create a list of the first 100 pentagonal numbers. The pentagonal numbers are 1, 1+4, 1+4+7, 1+4+7+10, … The addends start out at 4 and then increase by three. The picture on the right explains it. The red node is a very reduced pentagon with one vertex. The orange one has four more nodes, but then for the yellow one, we insert one node in three lines, for the green one the same, etc. If you want to, you can check wikipedia on the formula and its reason.