**Fourier Series**

*Part 3: Changing the Scale*

So far we have proved the following theorem:

**Theorem 1**: If for with

Then converges uniformly to the function for any piecewise function.

In this segment we want to extend the above theorem for functions defined on the interval for any number . But that’s pretty simple: all we have to do is to map the interval onto : if is defined on then is defined on

**Theorem 2**: If for with

Then converges uniformly to the function for any piecewise function.

**Example**: Find the Fourier series for

We need to integrate according to the above formulas to find the Fourier coefficients:

Thus, the Fourier series for our function is:



**Exercises:**

1. Find the Fourier series for the ‘golden arches’
2. Compute the Fourier series for