1.4: The Period of a Periodic Function

A function *[Math Processing Error]* is said to be periodic with period *[Math Processing Error]* if *[Math Processing Error]*. In plain English, the function repeats itself in regular intervals of length *[Math Processing Error]*. The period of the function of Figure *[Math Processing Error]* is *[Math Processing Error]*.

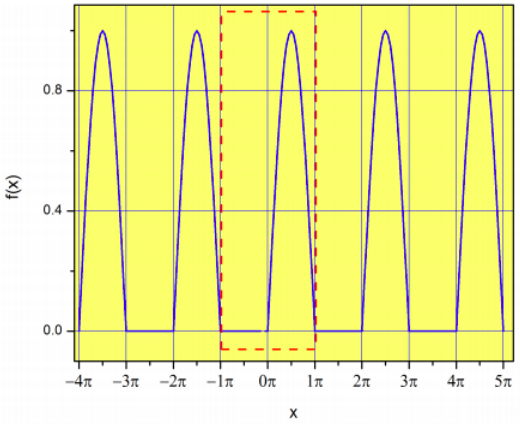

Figure *[Math Processing Error]*: A periodic function with period *[Math Processing Error]* (CC BY-NC-SA; Marcia Levitus)

We know that the period of *[Math Processing Error]* is *[Math Processing Error]*, but what is the period of the function *[Math Processing Error]*?

The period of *[Math Processing Error]* is *[Math Processing Error]*, so:

[Math Processing Error]

By definition, for a periodic function of period *[Math Processing Error]*, the function repeats itself if we add *[Math Processing Error]* to *[Math Processing Error]*:

[Math Processing Error]

Comparing the two equations: *[Math Processing Error]*, and therefore *[Math Processing Error]*.

For example, the period of *[Math Processing Error]* is *[Math Processing Error]*, and the period of *[Math Processing Error]* is *[Math Processing Error]* (see Figure *[Math Processing Error]*).

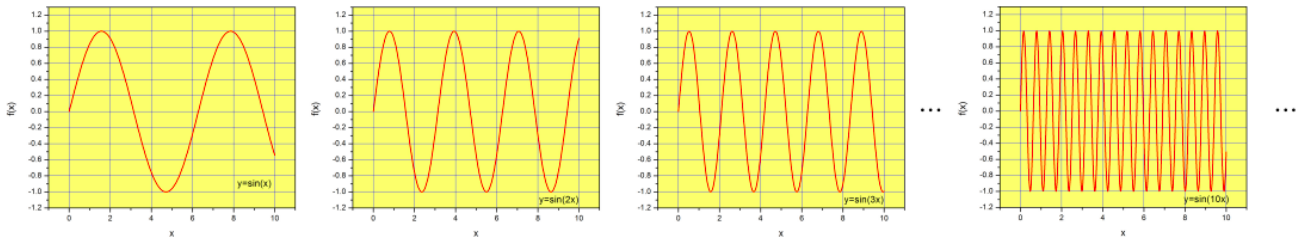

Figure *[Math Processing Error]*: Some examples of the family of functions *[Math Processing Error]*. From left to right: *[Math Processing Error]*, *[Math Processing Error]*, *[Math Processing Error]* and *[Math Processing Error]* (CC BY-NC-SA; Marcia Levitus)

You can follow the same logic to prove that the period of *[Math Processing Error]* is *[Math Processing Error]*. These are important results that we will use later in the semester, so keep them in mind!

> Test yourself with this short quiz! http://tinyurl.com/k4wop6l