

# **Fourier Series v1.00**

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## **Introduction:**

**First off, I would like to thank you for downloading this program. I hope it is as useful to you as it is for me. Even If you do not know what a Fourier series is, this program is still quite fascinating. A Fourier series is a series of sums of sines and cosines that approximate *any* function over a period of your choice. Since it is a series, there are an infinite number of terms but you are, obviously, able to choose how many terms you want to compute the series up to. You will need a TI-83 plus or a TI-84 plus to run this program. This program will compute the Fourier series of any function, including a piece-wise function across any range. It is perfect for anybody who is checking their homework solutions or checking their test questions. Due to the limited speed of the TI-83 plus/TI-84 plus, the program may take some time to compute for complex functions. By complex, I mean functions that are comprised of several pieces or are, in general, complex with many parts.**

## **How To Use:**

**To run this program, ungroup “FOURIER” from your group menu. You should ungroup five programs. Make sure that you run the program labeled “AFOURIER” and none of the other ones as they are sub programs. Once you run this program, you will enter a menu. The menu has 2 main options – computing a Fourier series across a standard**

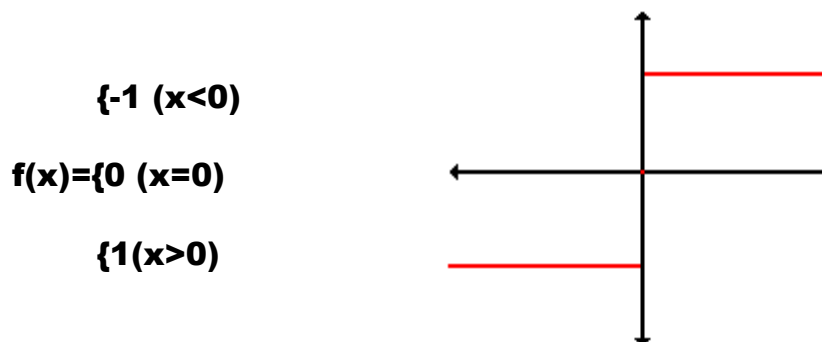
range from  $-\pi$  to  $\pi$  and computing a Fourier series from  $-L$  to  $L$  depending on your value of  $L$ . Chose whichever one is appropriate for you.

**For a single function:**

If  $f(x)$  is comprised of a single function, just enter your function and how many terms ( $n$ ) you want to compute your Fourier series for. The program will start the computation and will store the function to Y1 once it is finished. In addition, the function is also stored in String 3 (str3).

**For a piece-wise function:**

Suppose you want to enter a function such as the square wave into the calculator. Since there is no single equation which defines such a function, you will have to do some creative manipulation to achieve this. Let us define  $f(x)$  as the following:



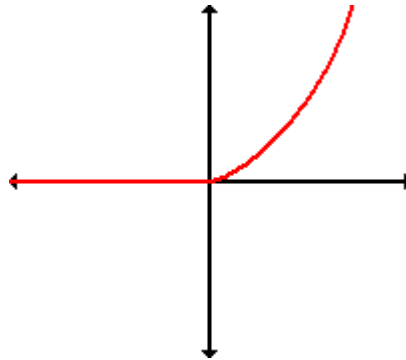
In this function, the first thing you must do is disregard the 0 at  $x=0$ . The calculator will still give you the same answer if you ignore this. This is for any part of the function that is valid at only single points. Secondly, you know that when  $x$  is less than 0, the function is -1. And, you know that when  $x$  is greater than 0,  $x$  is 1. Therefore, to type in this function, type in the following in for  $f(x)$ :

$$f(x): -1(x < 0) + 1(x > 0)$$

**This may seem very easy...and it is! Simply obtain the functions and its limits from the exam/homework question.**

**Here is another example:**

$$f(x) = \begin{cases} 0 & (x < 0) \\ x^2 & (x \geq 0) \end{cases}$$



**Simply type this function in as:**

$$f(x): 0(x < 0) + x^2(x \geq 0)$$

## **Questions?**

**If you need to report errors/bugs and/or have any questions, please email me. Thank you for using my program.**