Linear vs Circular Convolution

Linear:

As shown in class, discrete linear convolution gives us the same result (and works the same) as the continuous time convolution you learned about in EE33. Linear basically gives us a sampled version of the continuous convolution output (and is demonstrated on the John Hopkins website... see link on our website)

Correct Answer, but slow computing…

Circular:

To better explain circular convolution, see the attached .pdf from the Mitra text.

First, you need to understand **circular shift**

See mitra section 3.4.1 and understand Figure 3.10.

Second, understand **discrete circular convolution**

See mitra section 3.4.2, particularly example 3.15 (starts on page 143 and continues on page 144… grey section). Mitra walks step by step through a simple circular convolution.

Note Figure 3.13, showing the result using the same input data of example 3.15 for both linear and circular convolution. And for circular

Incorrect Answer, but faster computation…

So why do we care about Circular Convolution if it gives us the wrong answer?

That will be the subject of next lesson.

Hint: we would like the speed of circular convolution, but the correct result of linear convolution. We will also learn about how to use the DFT to help use implement convolution. Somehow, properly combining these 3 approaches to convolution will result in a method to do a fast convolution with the correct result.