EE313 Lecture 11

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Fourier, fundamental period of $e^{j\frac{2\pi}{T}t}$ is T.
Similarly, fundamental period of $e^{j3\cdot\frac{2\pi}{T}t}$ is $\frac{T}{3}$.

Dirichlet conditions for some $x(t)$

C1: Absolute integrability

C2: Any finite interval has a finite number of maxima and minima Examine: $sin(\frac{1}{n})$ and constructions of Cantor dust.

C3:

All three conditions satisfied imply that $x(t) = \sum a_k \cdot e^{j\frac{2\pi}{T}t}$.
How to find the Fourier series coefficients a_k?
Note that the Fourier series is the projection of a function onto the frequency domain. Thus each a_k represents a projection of $x(t)$ onto the ferquency.

Define the dot product between two continuous time functions as:
$< x_1(t), x_2(t) >= \int_0^{\tau} f(t) \cdot g^*(t)dt$.
We call this a Hilbert space.