The University of Texas at Austin
EE 313 Linear Systems and Signals
Prof. Brian L. Evans Fall 2018
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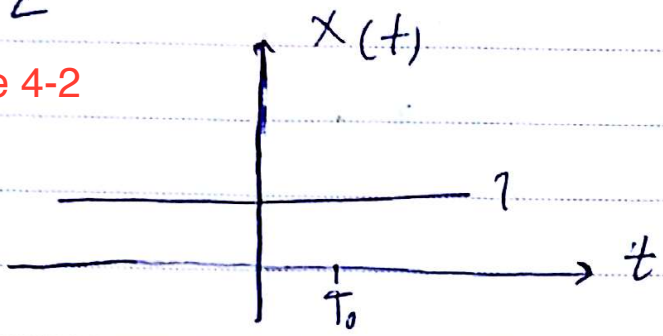
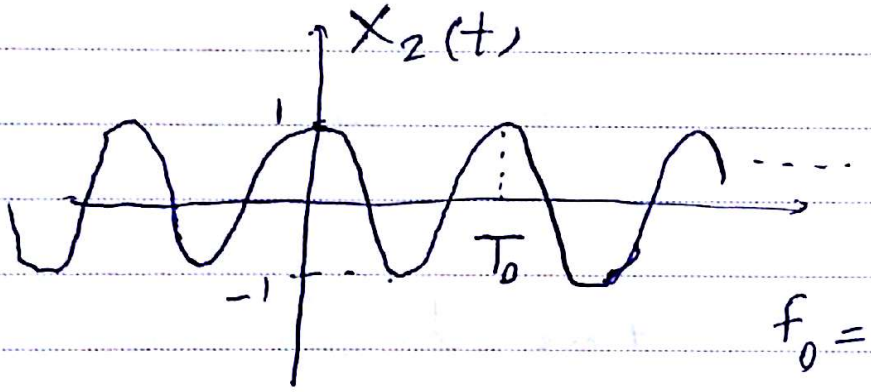
Lecture 4 Time-Frequency Spectrum



$x(t)$ is constant → $A_0 = 1$
$N = 0$

by selecting any range of time it's periodic



$A_0 = 0$

$f_0 = \frac{1}{T_0}$; $f_k = k f_0$

$f_1 = f_0$, $A_1 = 1$, $\phi_1 = 0$
$N = 1$

for $x_n(t) = 2\cos(20\pi(1)t) - \frac{2}{3}\cos(20\pi(3)t)$

$+ \frac{2}{5}\cos(20\pi(5)t)$

$f_0 = 10$ Hz , $f_k = k f_0$, $N = 5$
$A_2 = A_4 = 0$ $\phi_k = 0$ for all k

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from each Octave to the next, the frequency multiplies by 2.

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$$\text{beat time} = \frac{60\ [\text{seconds/minute}]}{\text{bpm}[\text{beats/minute}]}$$

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How many samples in each segment? N

spectrogram only shows values for positive frequency

segments overlap in time domain

→ two views of a signal & → more accuracy

for example: shift $= \frac{N}{2}$

if shift $> N$ → will lose some samples