

Agenda CENG 3315 February 14, 2022

HW2 Was Due Thursday 2/10/2022

Note: Please be neater (Some of you). Do the problems on scratch paper and copy to your HW to turn in to me.

SHOW YOUR WORK NOT JUST THE ANSWER.

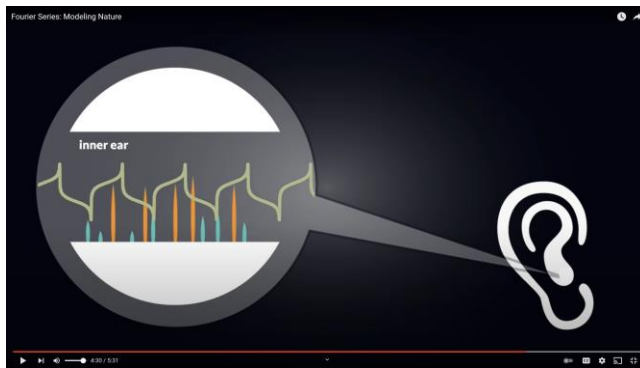
When a value has a unit – include the unit, i.e. .45 ms.
(It can help a lot to avoid mistakes in some problems.)

1. HW2 Solutions and MATLAB

Fourier worked around 1800. The Greeks were older.

An intuitive means of understanding the power of Fourier series in modeling nature, to place Fourier series in a physical context for students being introduced to the material. A non-technical, qualitative exploration into applications of Fourier Series.

0:17 Ancient Greek theory of celestial motion 3:27 How the brain processes sound This video was created by Clare Zhang (MIT Class of 2016) as part of MIT's CMS/ES.333 Production of Educational Videos course.



Your ears (and Brain) can do a Fourier Analysis. A cochlear implant is basically a set of filters with amplifiers in various bands.

<https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/cochlear-implant-surgery#:~:text=A%20cochlear%20implant%20is%20a,part%20sits%20behind%20the%20ear.&text=A%20cochlear%20implant%20may%20help,to%20hear%20and%20understand%20speech.>

Sine wave becomes a Square Wave ?

The point of the comparison of the square wave and the sine is that your ears hear frequencies maybe up to 20 kHz. A square wave of period $T = 0.01$ seconds or 100 pulses per second has harmonics of 300 Hz and so on. However, a square wave with a 10 kHz fundamental frequency has harmonics starting at 30 kHz above the hearing range. We only hear the fundamental at 10 kHz so it sounds like a sine wave.

Our ears are Low Pass filters!

[2_2_3315_HW2_P2__Hand.pdf](#)

[2_3_3315_HW2_P3_Hand.pdf](#)

[2_4_HW2_Prob4_ClockPulseSolution.pdf](#)

[3_HW2_3315_MATLAB_ANS.pdf](#)

[3a _ Run MATLAB- 3_HW2_3315_Sp2022MATLAB](#)

Choose the .m file and Open With 2021a

[4_HW2_ANS_3315_Sp22Summary.pdf](#)

ON WEB

[LectureCh2_3 ComplexNos Euler](#)

[LectureCh2_4 SineAdd](#)

[Lecture3_1 Spectrum L05](#)

Continue CHAPTER 3 - Good Review Videos Here

[FourierProblemSession EvenPulseTrain](#)

[MATLAB Fourier EvenPulseTrain](#)

[Fourier_MATLAB_Symbolic&Pulses](#)

[Algorithm For Fourier Series](#)

[FourierCh8 TLH](#)

[FourierReferences 2021](#)

Previous Lectures

[MATLAB Fourier SquareWave](#)

[Lectures3 4Harmonics L6](#)

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[Ch3 FourierSeries&TLH_Ch8_4](#)

[Chapter3 FWRS Example](#)