

# EN 1: Engineering in the Kitchen

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# Discussion

With your table:

What is your dream career? How does engineering school fit into that?

# Re-routing a few things

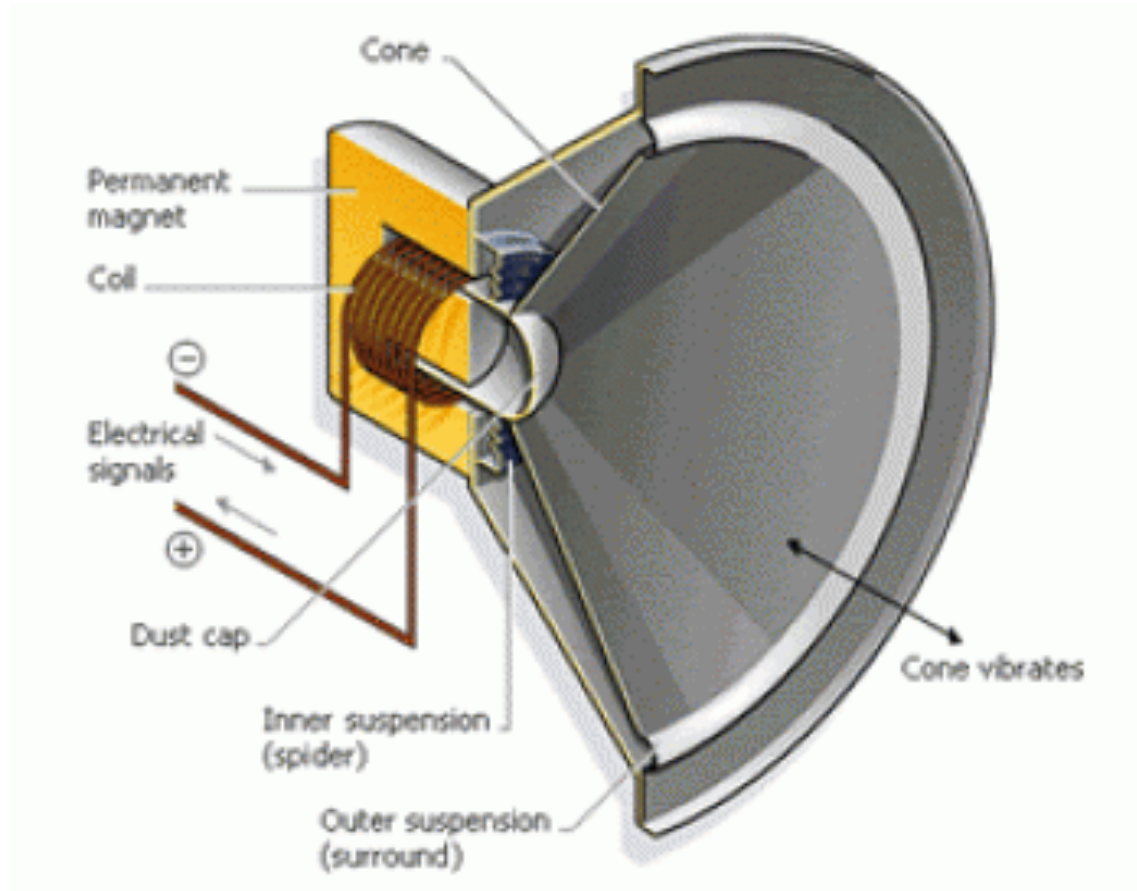
Possible deep-dive session on Friday

I may change up some things for next week; stay tuned

**Use Piazza!**

# Speakers

Convert changing voltage to sound using an electromagnet



In EE, a **signal** is a quantity  
(such as voltage)  
that varies as a function of time.

**Let's play with some sounds**

[onlinetonegenerator.com](https://onlinetonegenerator.com)

# Frequency domain

Voltage vs time isn't the only way to talk about a signal: we might also talk about frequencies.

You can hear "high" and "low" frequencies

An instrument or voice produces harmonics



# Real example: DTMF tones

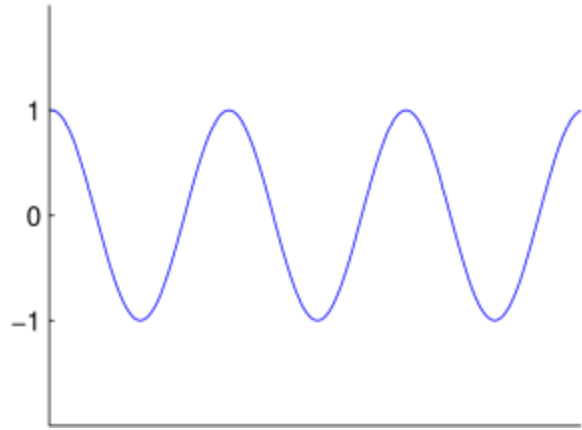
When you get a phone menu, how does the automated system know what button you've pressed?

[onlinetonegenerator.com/dtmf.html](http://onlinetonegenerator.com/dtmf.html)

# Fourier series

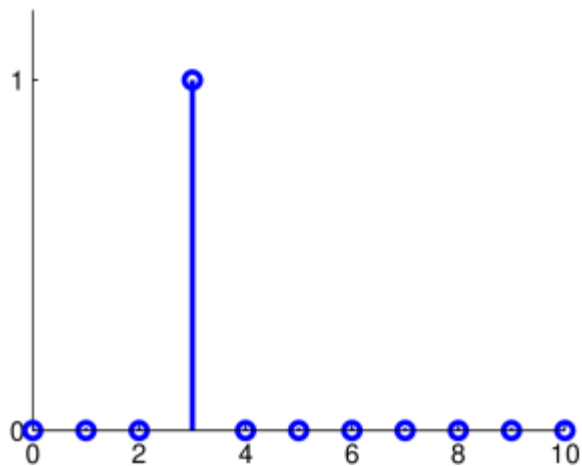
[falstad.com/fourier/index.html](http://falstad.com/fourier/index.html)

# Matching problem 1

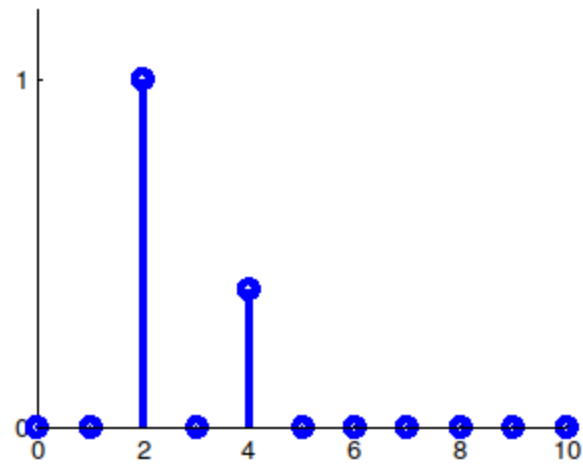


Which is the frequency spectrum for this signal?

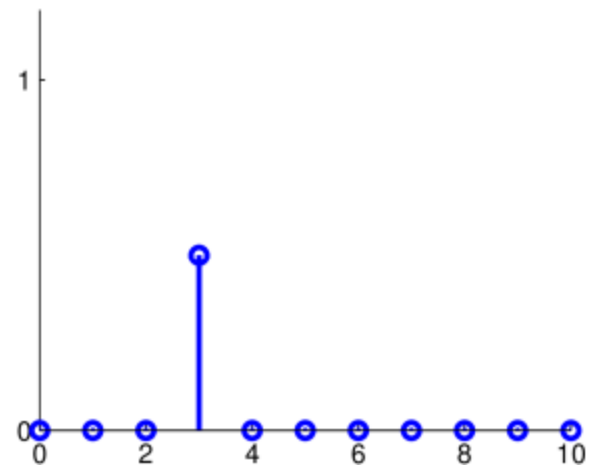
**A**



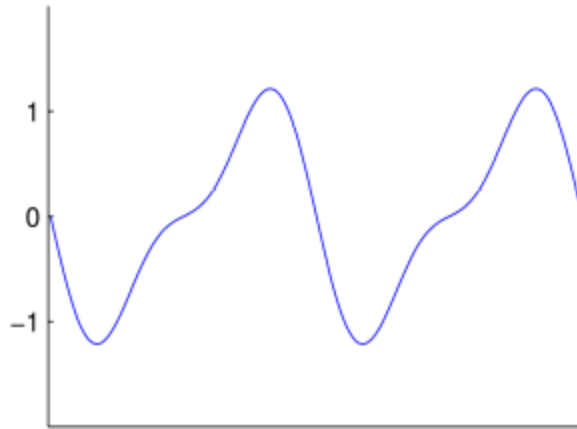
**B**



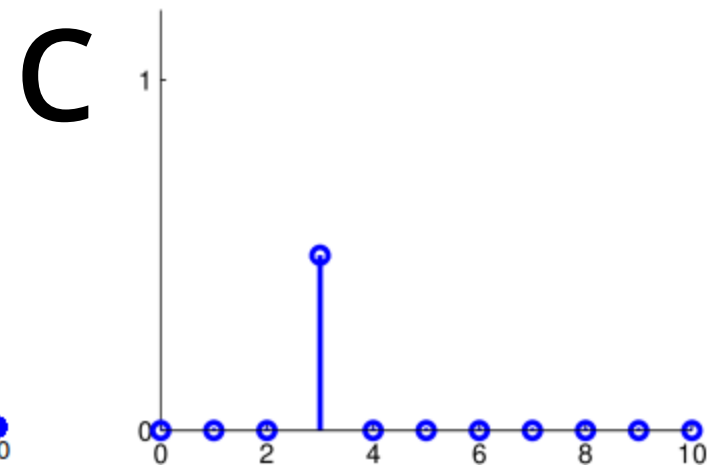
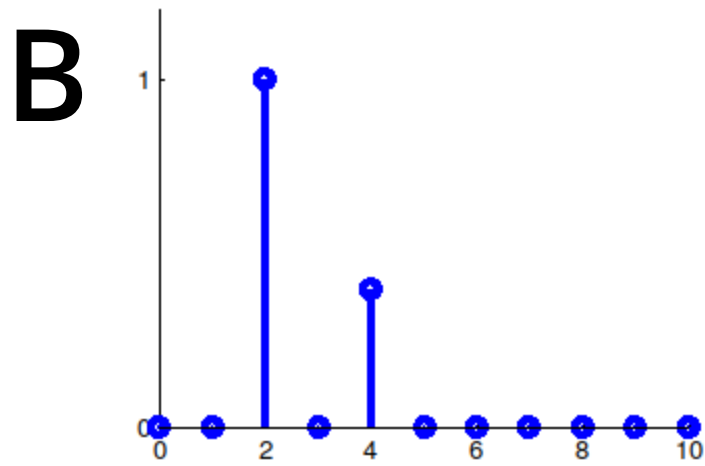
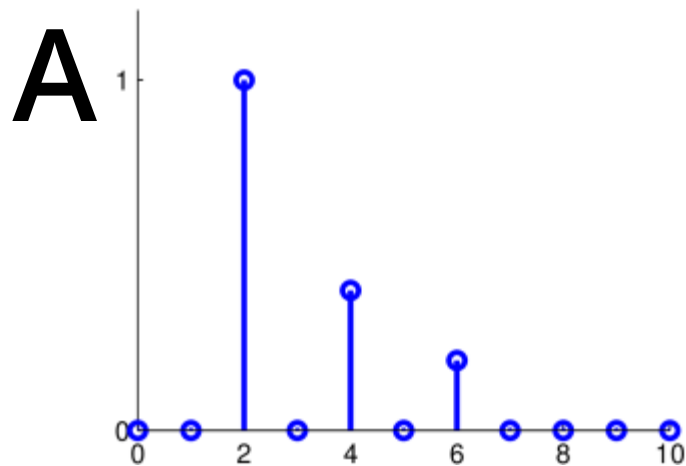
**C**



# Matching problem 2



Which is the frequency spectrum for this signal?



# Playing with sound in audacity

# Mid-semester feedback

Link posted on Piazza

# Sound with the ESP32

You have to consider sample rate

# Sound with the ESP32

Example posted on the course website soon