# Hi Dr. Fitzgerald!

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# 1    Introduction

This an example of a julia script that I stole using Weave. The script can be executed normally using Julia or published to HTML or pdf with Weave. Text is written in markdown in lines starting with "#' " and code is executed and results are included in the published document.

Notice that you don't need to define chunk options, but you can using `#+.` just before code e.g. `#+ term=True, caption='Fancy plots.'`. If you're viewing the published version have a look at the source to see the markup.

# 2    FIR Filter Design

We'll implement lowpass, highpass and ' bandpass FIR filters. If you want to read more about DSP I highly recommend The Scientist and Engineer's Guide to Digital Signal Processing which is freely available online.

## 2.1    Calculating frequency response

DSP.jl package doesn't (yet) have a method to calculate the the frequency response of a FIR filter so we define it:

```julia
using Plots, DSP
gr()

function FIRfreqz(b::Array, w = range(0, stop=π, length=1024))
    n = length(w)
    h = Array{ComplexF32}(undef, n)
    sw = 0
    for i = 1:n
      for j = 1:length(b)
        sw += b[j]*exp(-im*w[i])^-j
      end
      h[i] = sw
      sw = 0
    end
    return h
end
```