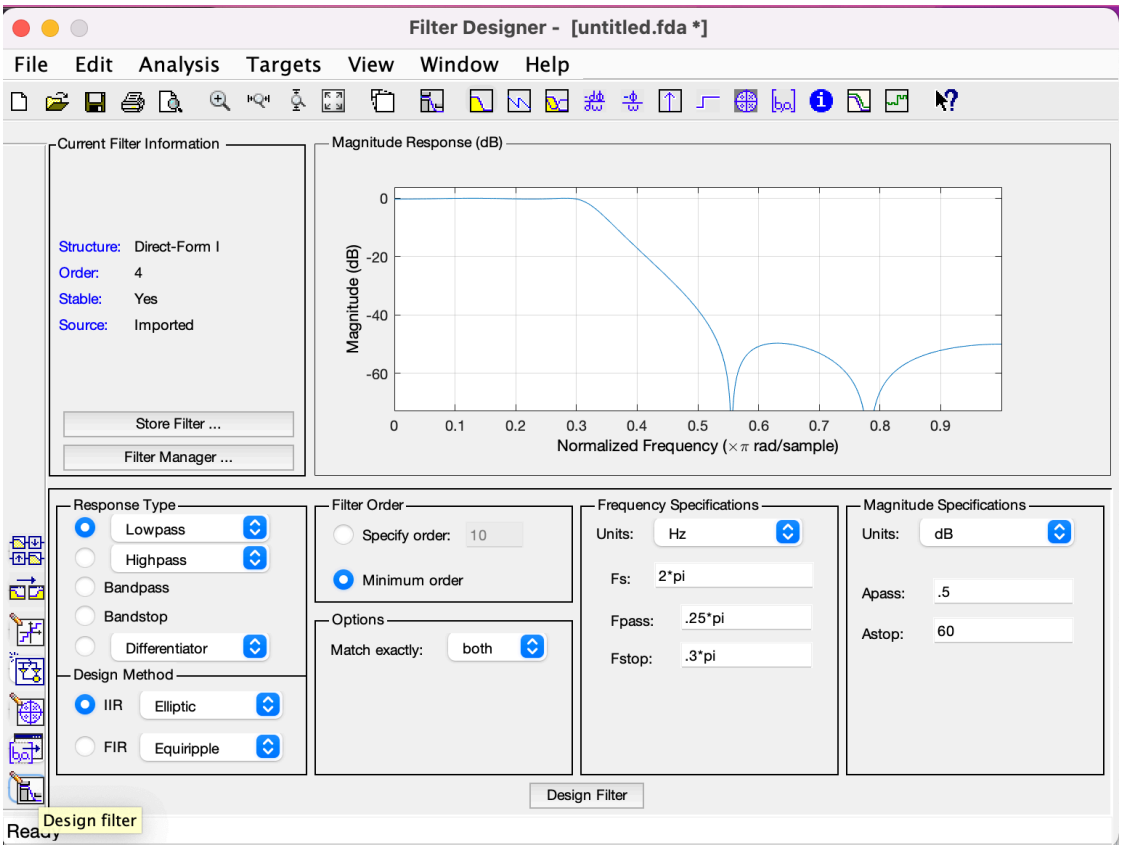
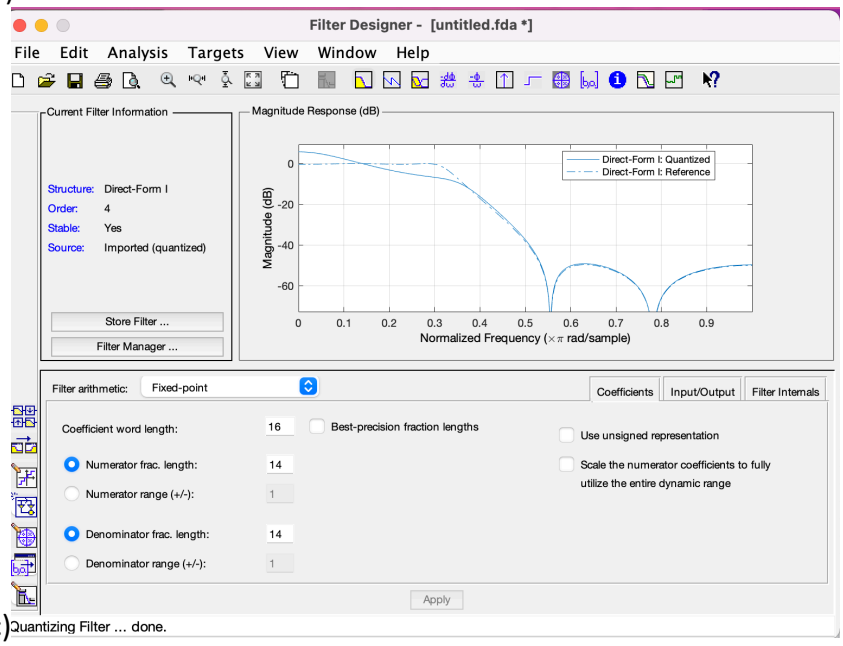
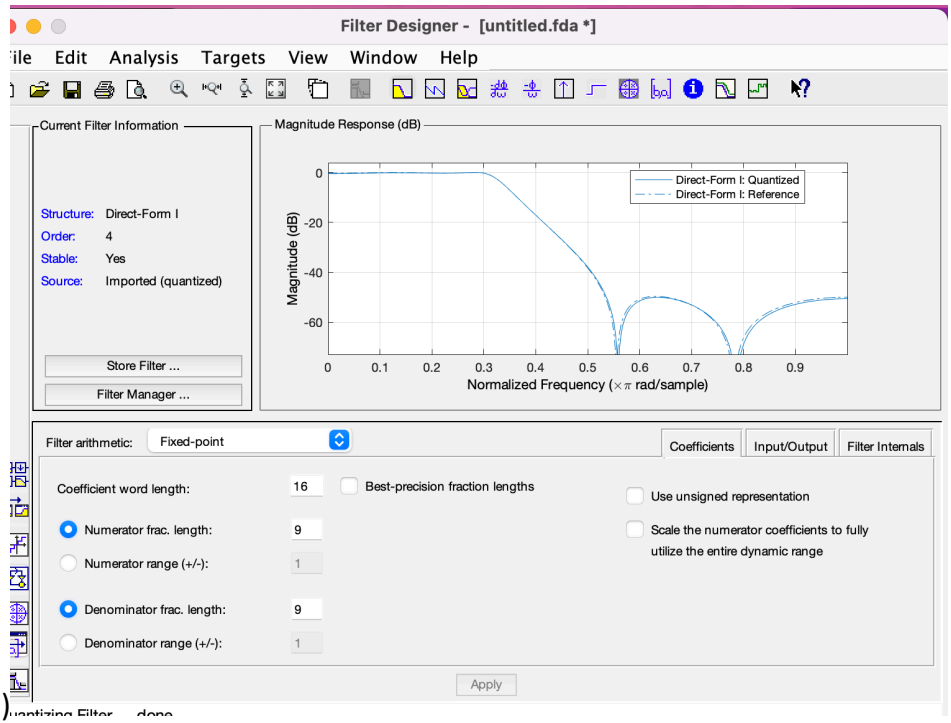

Filter Designer - [untitled.fda *]
File Edit Analysis Targets View Window Help
Current Filter Information
Structure: Direct-Form I
Order: 4
Stable: Yes
Source: Imported
Store Filter ...
Filter Manager ...
Magnitude Response (dB)
Magnitude (dB)
Normalized Frequency (×π rad/sample)
Response Type
Lowpass
Highpass
Bandpass
Bandstop
Differentiator
Design Method
IIR
Elliptic
FIR
Equiripple
Filter Order
Specify order: 10
Minimum order
Options
Match exactly: both
Frequency Specifications
Units: Hz
Fs: 2*pi
Fpass: .25*pi
Fstop: .3*pi
Magnitude Specifications
Units: dB
Apass: .5
Astop: 60
Design Filter
Design filter
Ready

4b)


Filter Designer - [untitled.fda *]
File Edit Analysis Targets View Window Help
Current Filter Information
Structure: Direct-Form I
Order: 4
Stable: Yes
Source: Imported (quantized)
Store Filter ...
Filter Manager ...
Magnitude Response (dB)
Direct-Form I: Quantized
Direct-Form I: Reference
Magnitude (dB)
Normalized Frequency (×π rad/sample)
Filter arithmetic: Fixed-point
Coefficients
Input/Output
Filter Internals
Coefficient word length: 16
Best-precision fraction lengths
Use unsigned representation
Numerator frac. length: 14
Numerator range (+/-): 1
Scale the numerator coefficients to fully utilize the entire dynamic range
Denominator frac. length: 14
Denominator range (+/-): 1
Apply
Quantizing Filter ... done.

4c)

4d)



4e) The figure in 4b doesn't match 4a. I think this is because the matlab function doesn't defult to Direct Form 1. Comparing 4c to 4b you can see that the curve diverges. I think this is because it only has 2 binary digits for the integer values. When you use 9 bits as fraction in 4d there are more bits for the integer part. I experimented a little with increasing the integer bits with 14 decimal bits and it matched the curve much better.