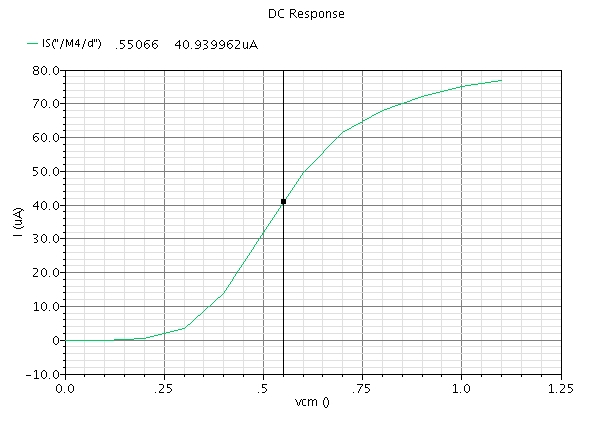
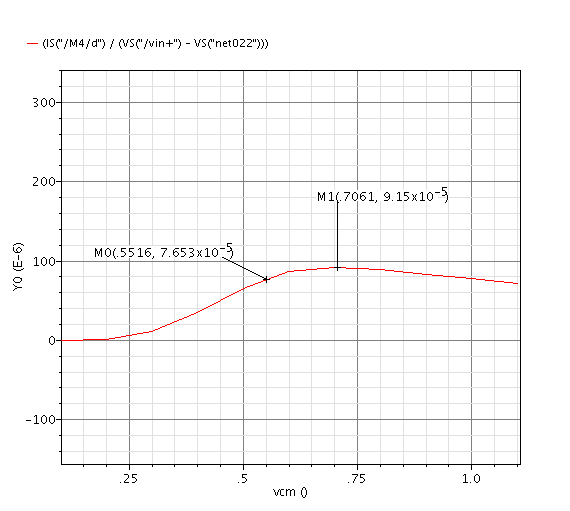
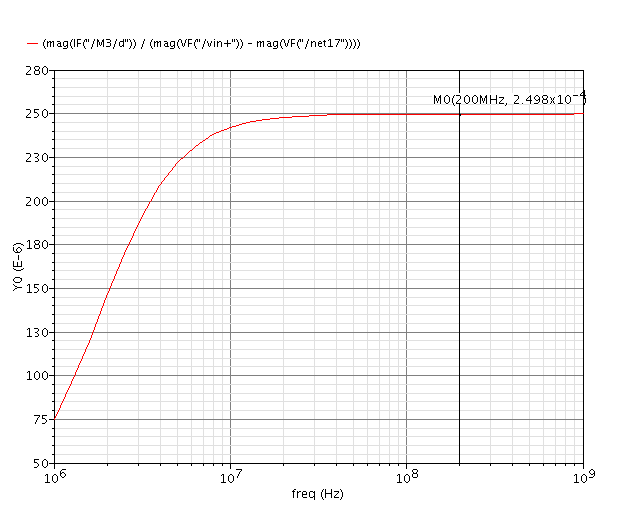
Id - Vcm



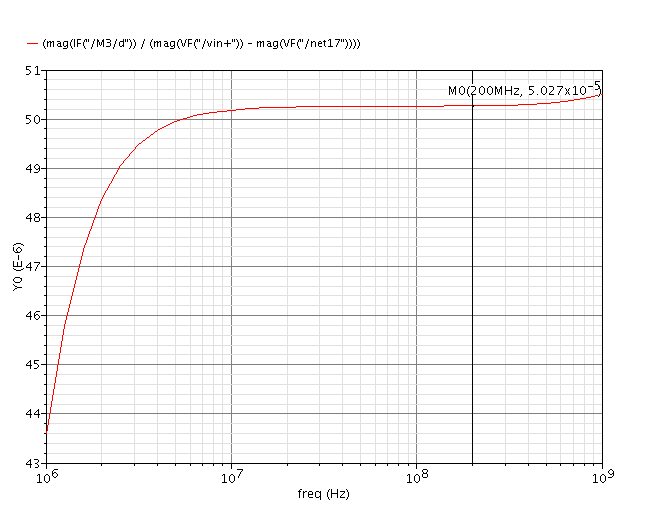
gm – Vcm



Gm when ibias=34u @ 200MHz

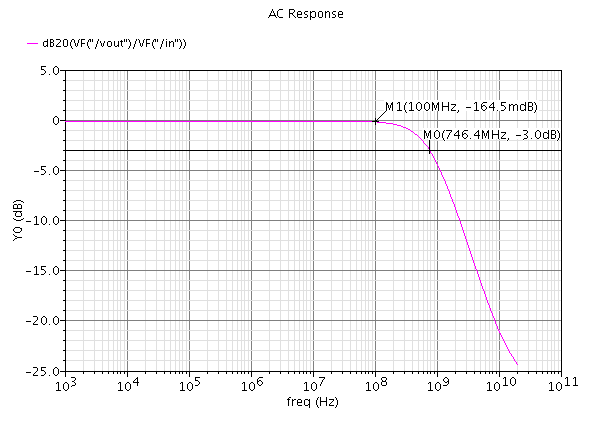


Gm when ibias=4.4u @ 200MHz



2.

A)



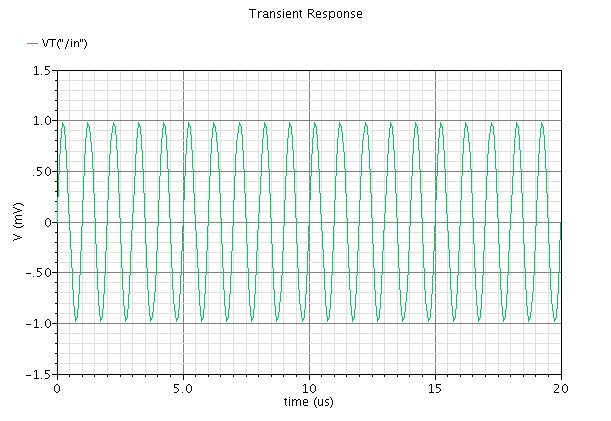
A general expression for a bi-linear filter:

It is easy to tell that: therefore:

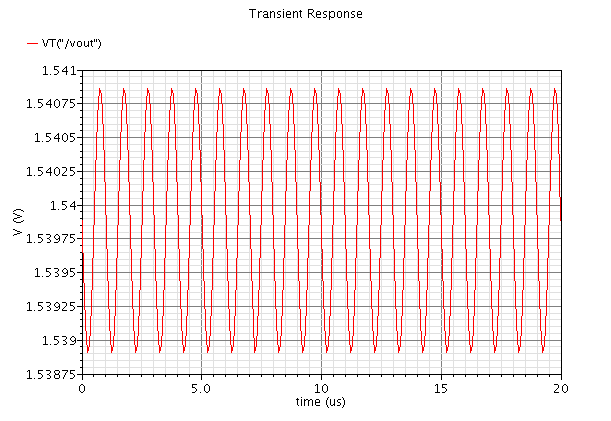
At , where :

B)

Input waveform (1mV, 1MHz):

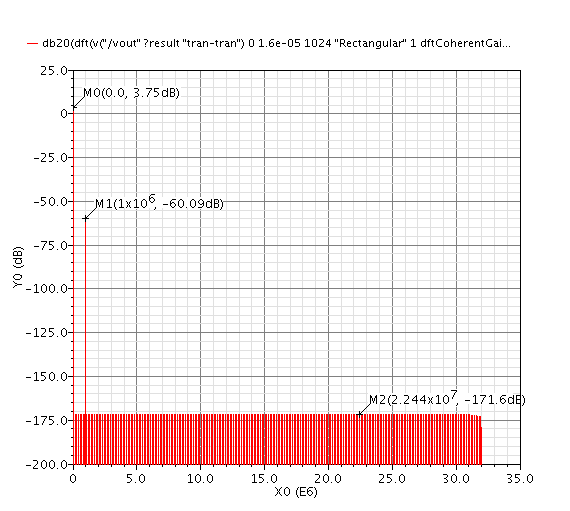


Output waveform (1mV, 1MHz):

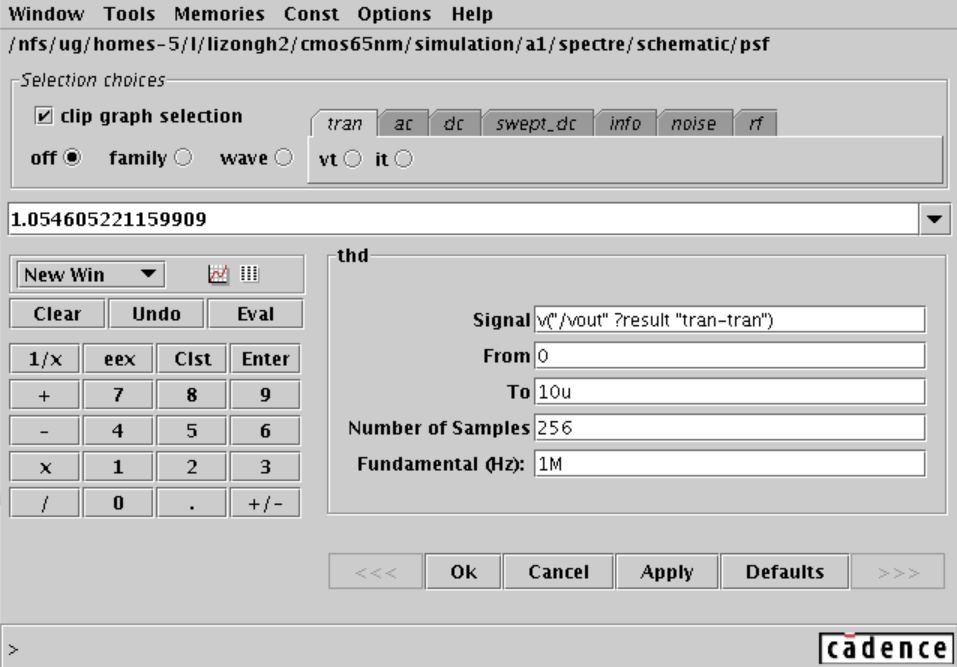


Output DFT (1mV, 1MHz)

Select , , leading to a resolution of , set stop time to 16us, which contains 16 cycles of 1MHz signal, and in total 1024 points.

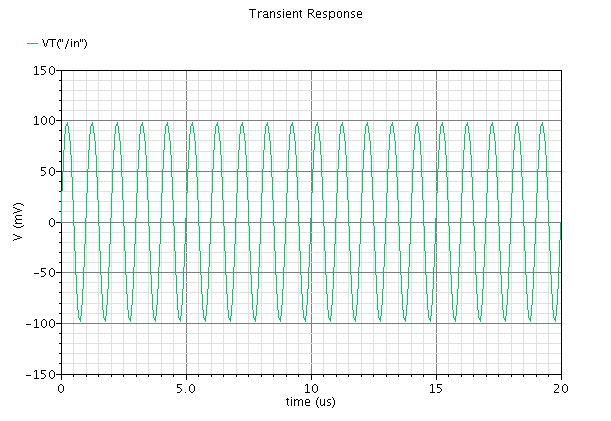


THD (1mV, 1MHz):

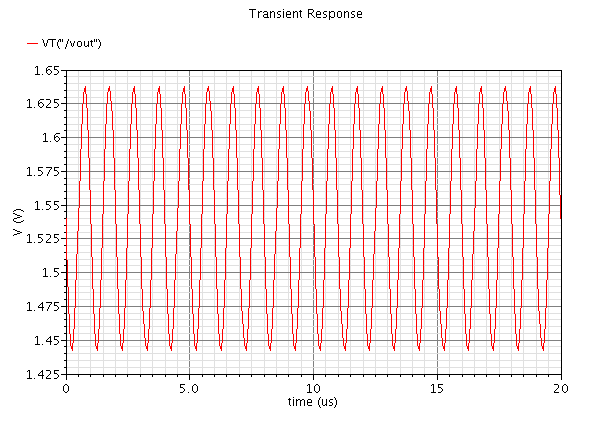


C)

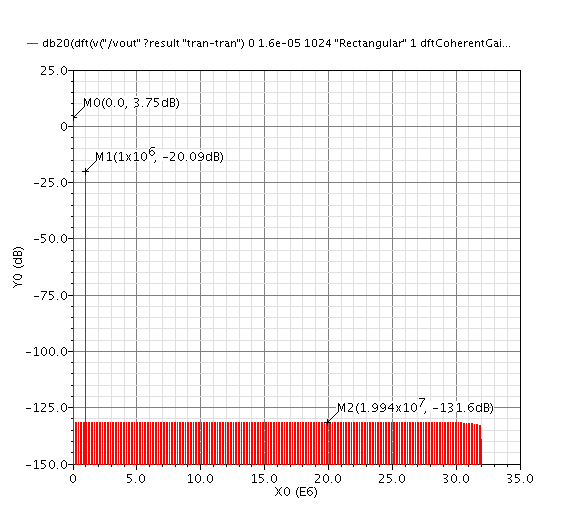
Input Waveform (100mV, 1MHz)



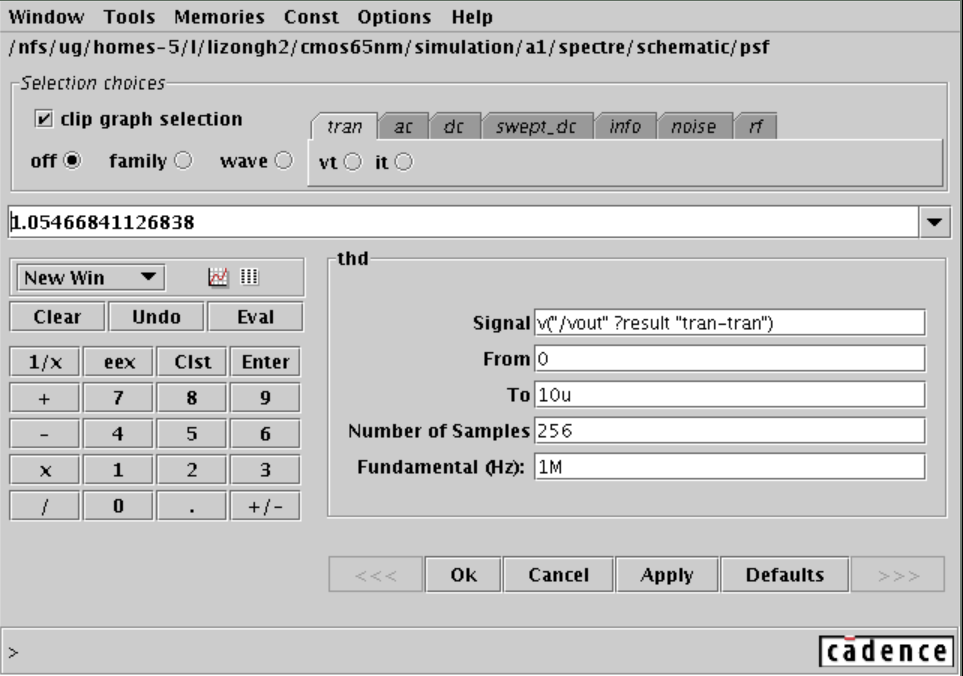
Output Waveform (100mV, 1MHz)



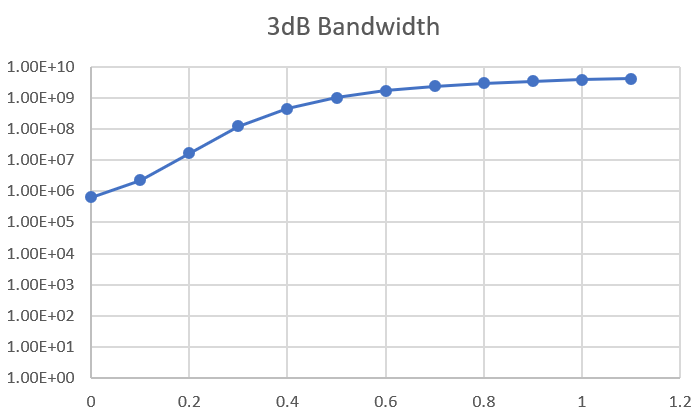
DFT (100mV, 1MHz)

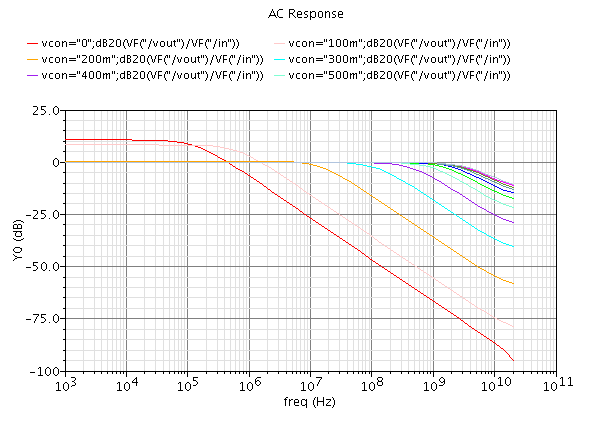


THD (100mV, 1MHz)



D)

D) 



3.

A general second order filter:

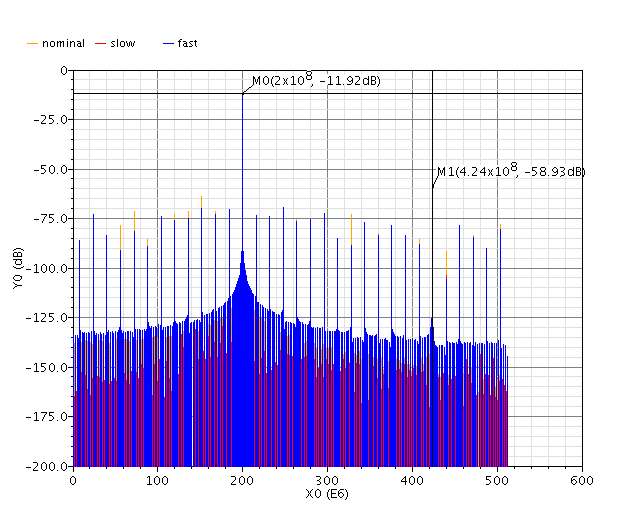
For a bandpass filter with , , therefore:

Using the design equation from Lecture 3:

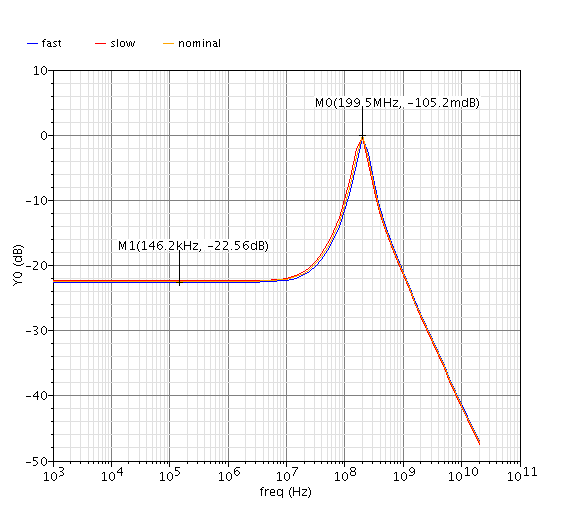
Say, if the G = 1, :

For DFT simulations (200MHz):

Fs = 1024MHz, N = 1024, t = 1us



||



Transient response

