ESE 562 Project 1

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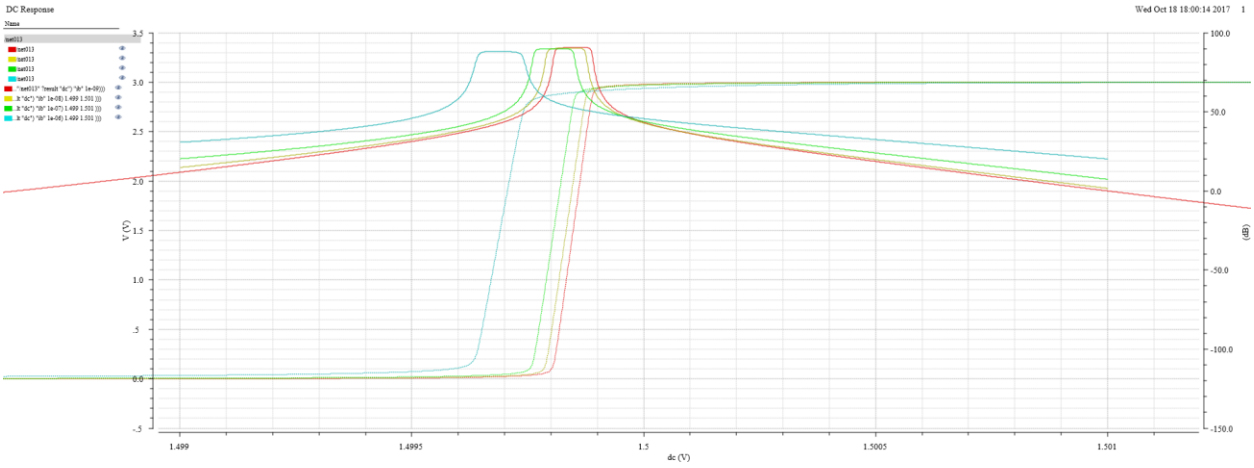
1.

Vdd =3V

I_b	Gain(db)	Dynamic Range	Power ($3I_b$*Vdd)
1 na	90.66	2.9999177432	9 nw
10 na	90.3	2.9999544002	90 nw
100 na	89.92	2.9996431078	900 nw
1ua	88.25	2.9965689450	9000 nw

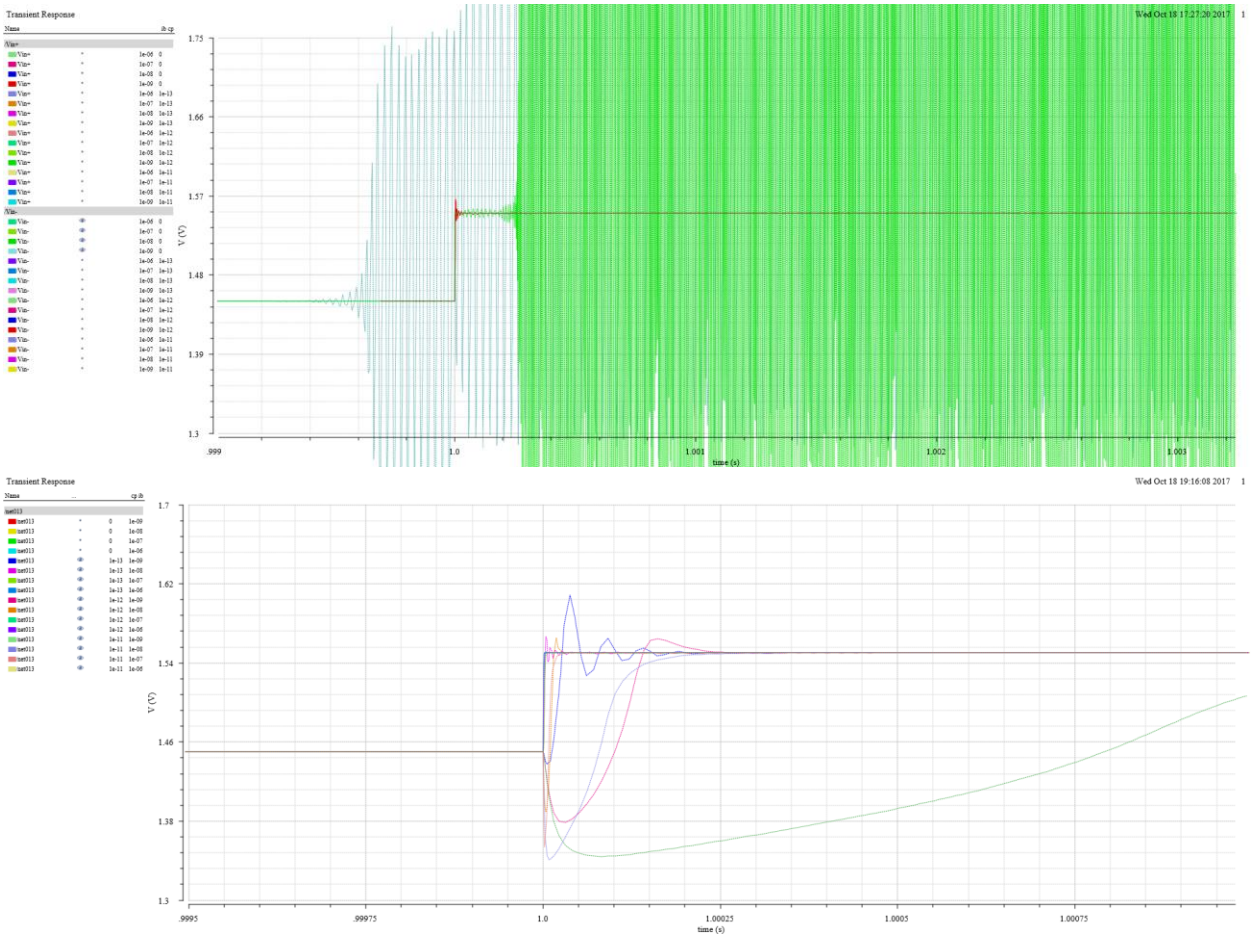


2.

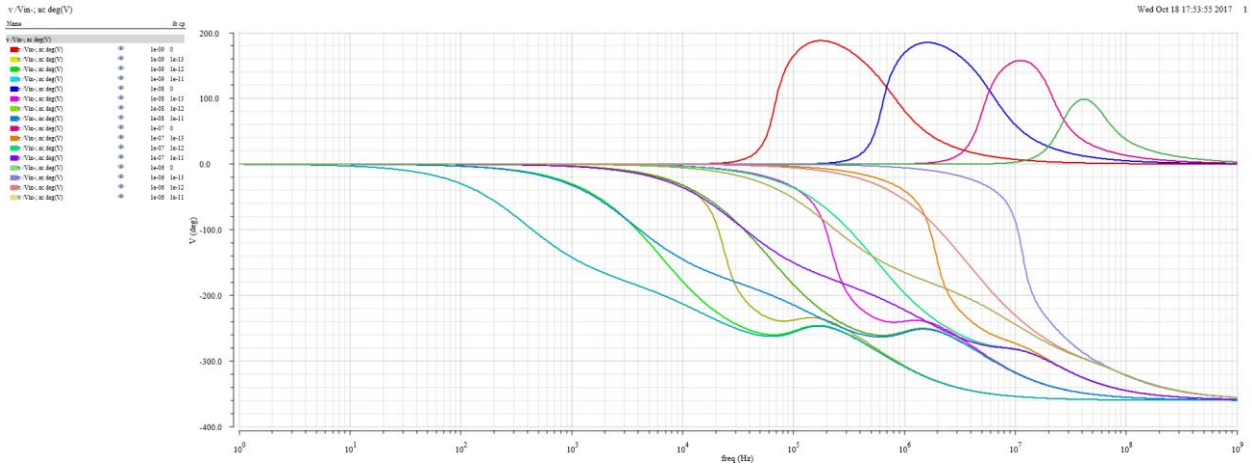
I_b	C	Setting Time (sec)	Overshoot
1 ua	0.1p	0.000000911	59.02800062E-3
100 na	0.1 p	0.000001039	17.04848489E-3
10 na	0.1 p	0.000006241	270.7085913E-6
1 na	0.1 p	0.000095723	335.9898122E-6
1 ua	1p	0.000001317	14.39409119E-3
100 na	1p	0.000002788	15.94468135E-3
10 na	1p	0.000020056	1.948771228E-3
1 na	1p	0.00018319	350.935458E-6
1 ua	10p	0.000003481	222.5530934E-6
100 na	10p	0.000015944	184.690184E-6
10 na	10p	0.00014793	668.9398784E-6
1 na	10p	0.001409787	416.1767558E-6

1 ua	0p	X	
100 na	0p	X	
10 na	0p	X	
1 na	0p	X	

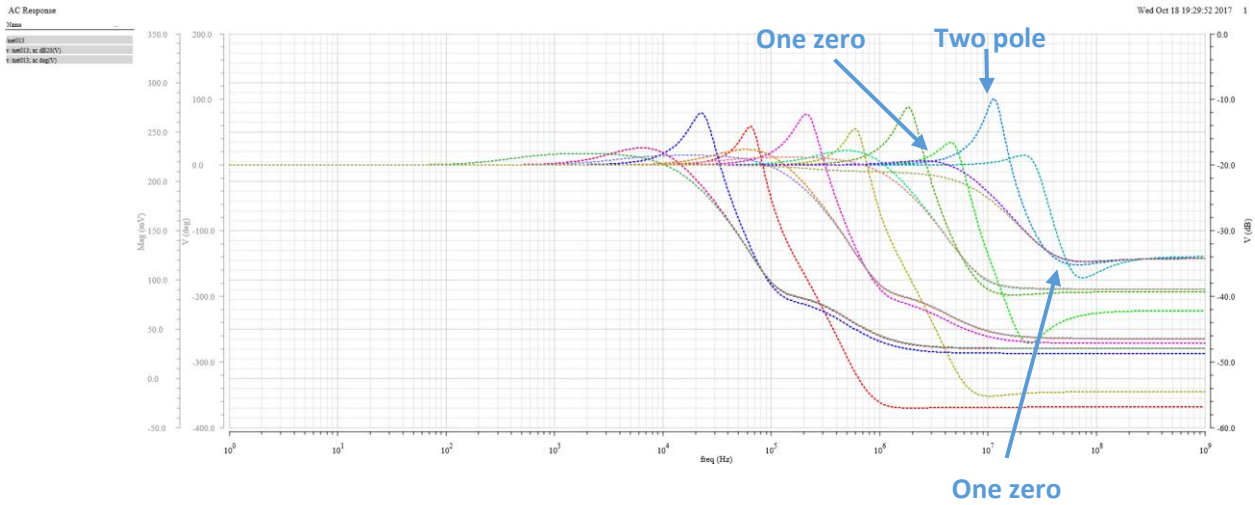
Before gain decreases to 0db, phase margin is negative. So the system is unstable and ringing. We can't measure the setting time due to the above reason.

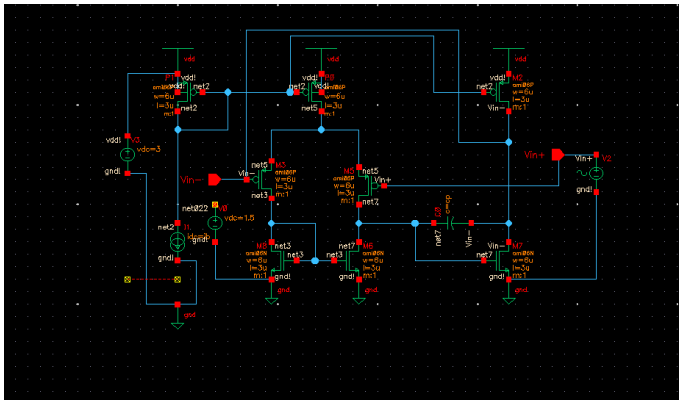


3.



As the following figure (magnitude plot) shows, there are two zeros and two poles.





20 dB/decade drop of the pole is arrested by the 20 dB/decade rise of the zero resulting in a horizontal magnitude plot for frequencies above the zero location. As a result, the result above perfectly match the circuit. My experiment is successful.