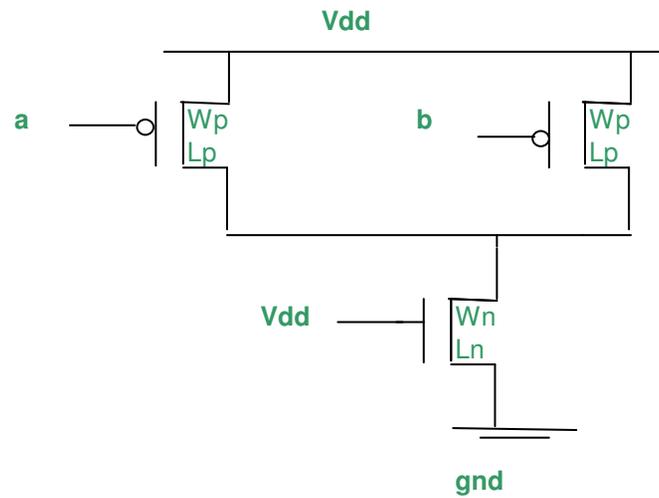


This sheet contains delays and output swing variations for 2 input subthreshold NOR gate shown in figure below

```
.PARAM vdd=.2  
.PARAM gnd=0  
.PARAM TDval=10N PW=1U TRR=.5U TRF=.5U TRUN =6U Wp=260n Lp=130n  
Wn=260.0n Ln=3000n
```



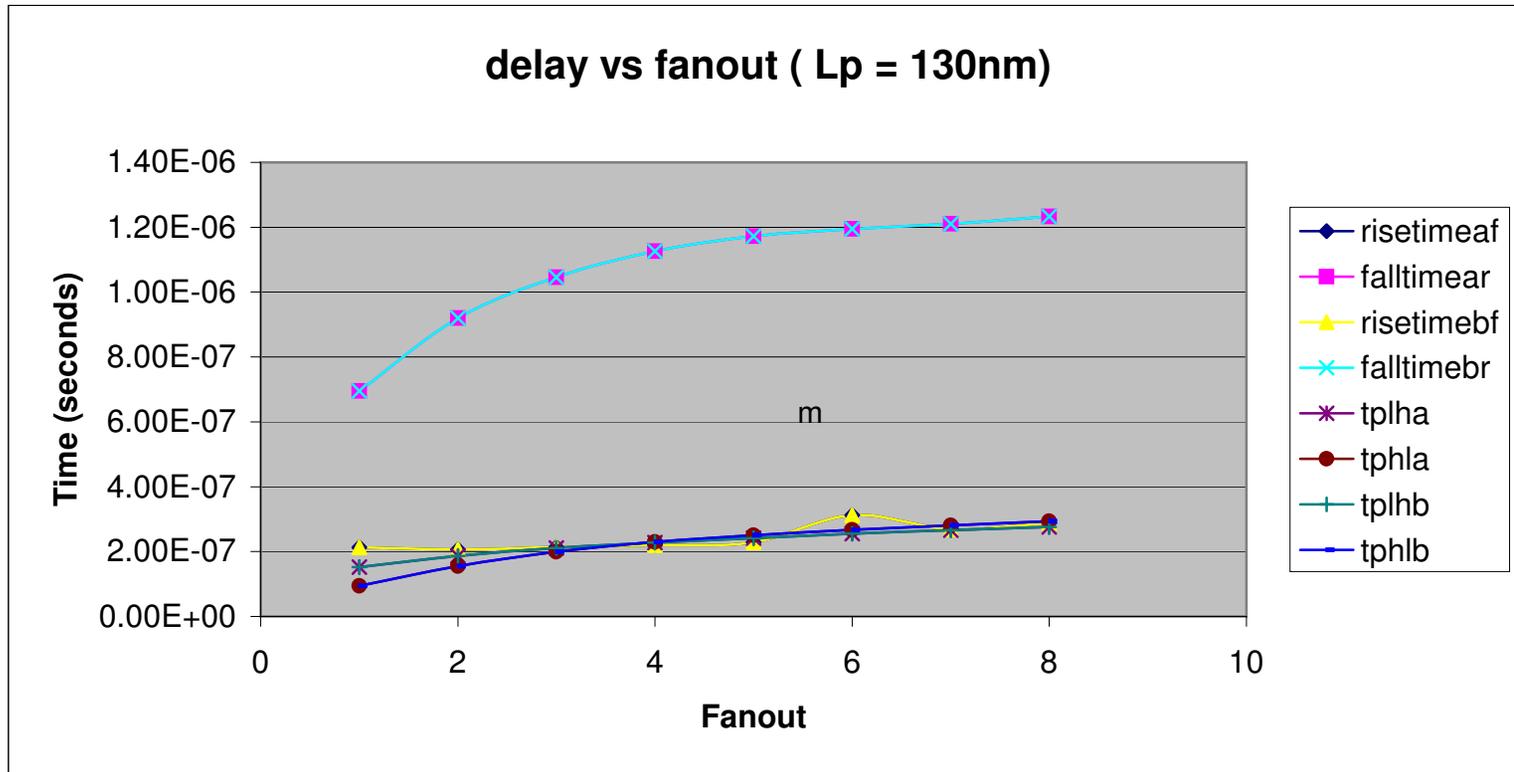


CHART 1

data for chart 1

fanout	vmaxa	vmina	vmaxb	vminb	risetimeaf	falltimear	risetimebf	falltimebr	tplha	tphla	tplhb	tphlb
1	0.1813	8.22E-02	0.1813	8.22E-02	2.13E-07	6.95E-07	2.13E-07	6.95E-07	1.52E-07	9.40E-08	1.52E-07	9.40E-08
2	0.1812	8.50E-02	0.1812	8.50E-02	2.06E-07	9.20E-07	2.06E-07	9.20E-07	1.87E-07	1.55E-07	1.87E-07	1.55E-07
3	0.1812	8.95E-02	0.1812	8.95E-02	2.14E-07	1.05E-06	2.14E-07	1.05E-06	2.11E-07	1.99E-07	2.11E-07	1.99E-07
4	0.1812	9.45E-02	0.1812	9.45E-02	2.20E-07	1.13E-06	2.20E-07	1.13E-06	2.28E-07	2.29E-07	2.28E-07	2.29E-07
5	0.1812	9.92E-02	0.1812	9.92E-02	2.29E-07	1.17E-06	2.29E-07	1.17E-06	2.41E-07	2.51E-07	2.41E-07	2.51E-07
6	0.1812	0.1037	0.1812	0.1037	3.13E-07	1.20E-06	3.13E-07	1.20E-06	2.56E-07	2.67E-07	2.56E-07	2.67E-07
7	0.1812	0.1076	0.1812	0.1076	2.69E-07	1.21E-06	2.69E-07	1.21E-06	2.66E-07	2.80E-07	2.66E-07	2.80E-07
8	0.1812	0.111	0.1812	0.111	2.87E-07	1.23E-06	2.87E-07	1.23E-06	2.75E-07	2.94E-07	2.75E-07	2.94E-07

## Appendix

fanout = Load of inverter

vmaxa = Max output voltage of NOR when a falls while b=0

vmina = Min output voltage of NOR when a rises while b=0

vmaxb = Max output voltage of NOR when b falls while a=0

vminb = Min output voltage of NOR when b rises while a=0

risetimeaf = output risetime when a falls and b = 0

falltimear = output falltime when a rises and b = 0

risetimebf = output risetime when b falls and a = 0

falltimebr = output falltime when b rises and a = 0

tphla, tpla, tphlb, tplhb are propagation delays when one of a and b rises or falls while keeping the other input at 0

\$\*\*\*\*\*

\$ Voltage Sources Declarations

\$\*\*\*\*\*

Va a gnd PULSE(0,.2,TDval,TRR,TRF,PW,2.5U)

Va1 a10 gnd 0V

Vb1 b gnd 0V

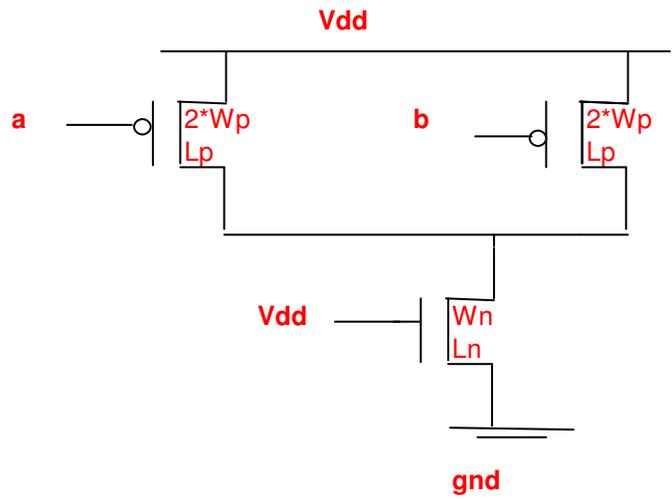
Vb b10 gnd PULSE(0,.2,TDval,TRR,TRF,PW,2.5U)

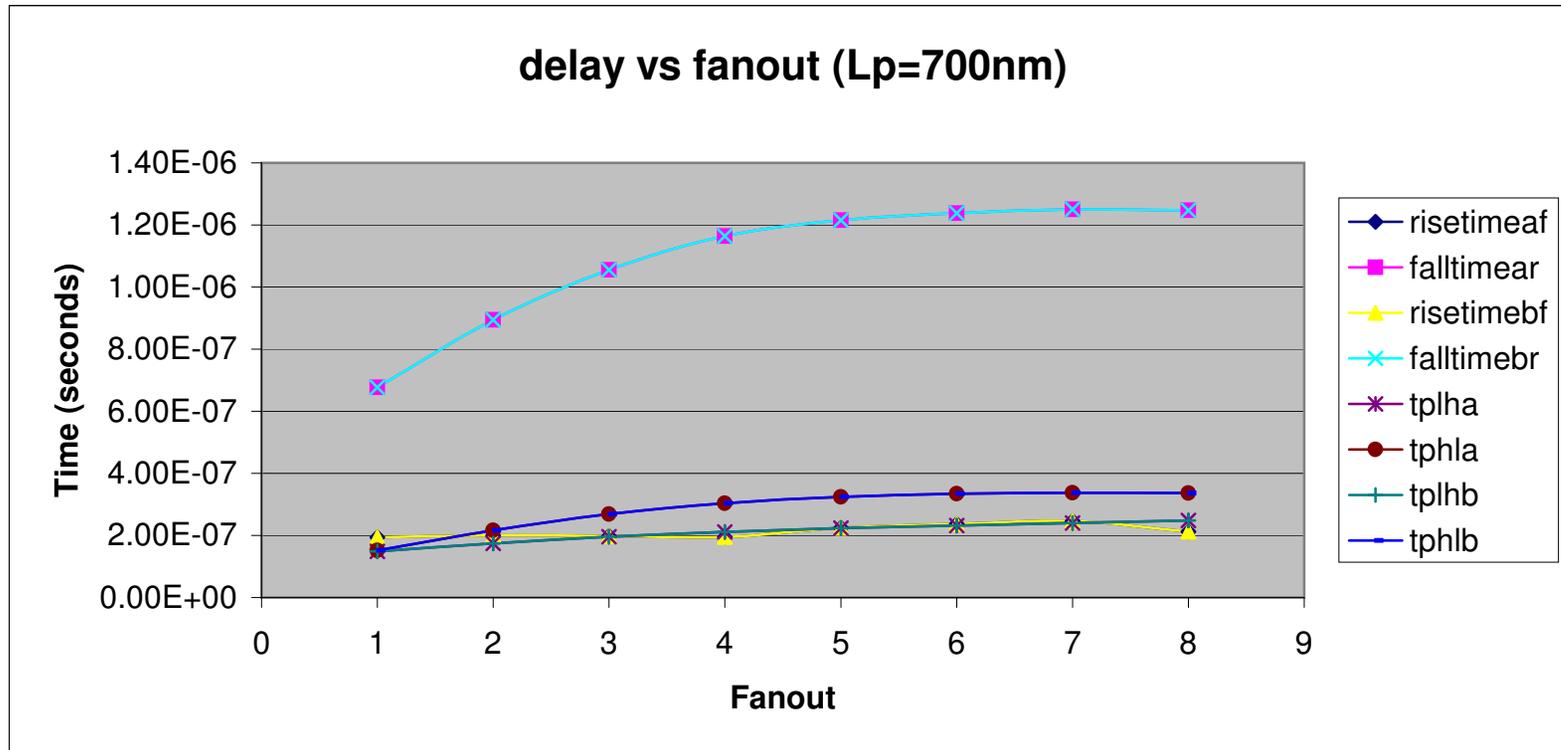
.PARAM vdd=.2

.PARAM gnd=0

**.PARAM TDval=10N PW=1U TRR=.5U TRF=.5U TRUN =6U Wp=260.0n Lp=700.0n**

**Wn=260n Ln=3000n**





**CHART 2**

data for chart 2

fanout	vmaxa	vmina	vmaxb	vminb	risetimeaf	falltimear	risetimebf	falltimebr	tplha	tphla	tplhb	tphlb
1	0.1821	6.13E-02	0.1821	6.13E-02	1.93E-07	6.77E-07	1.93E-07	6.77E-07	1.49E-07	1.52E-07	1.49E-07	1.52E-07
2	0.1821	6.19E-02	0.1821	6.19E-02	2.00E-07	8.95E-07	2.00E-07	8.95E-07	1.74E-07	2.17E-07	1.74E-07	2.17E-07
3	0.1821	6.48E-02	0.1821	6.48E-02	1.98E-07	1.06E-06	1.98E-07	1.06E-06	1.96E-07	2.69E-07	1.96E-07	2.69E-07
4	0.1821	6.96E-02	0.1821	6.96E-02	1.95E-07	1.16E-06	1.95E-07	1.16E-06	2.11E-07	3.04E-07	2.11E-07	3.04E-07
5	0.1821	7.56E-02	0.1821	7.56E-02	2.25E-07	1.22E-06	2.25E-07	1.22E-06	2.24E-07	3.24E-07	2.24E-07	3.24E-07
6	0.1821	8.18E-02	0.1821	8.18E-02	2.37E-07	1.24E-06	2.37E-07	1.24E-06	2.32E-07	3.34E-07	2.32E-07	3.34E-07
7	0.1821	8.75E-02	0.1821	8.75E-02	2.46E-07	1.25E-06	2.46E-07	1.25E-06	2.40E-07	3.38E-07	2.40E-07	3.38E-07
8	0.1821	9.29E-02	0.1821	9.29E-02	2.12E-07	1.25E-06	2.12E-07	1.25E-06	2.48E-07	3.36E-07	2.48E-07	3.36E-07