u_1

J_1

e_1

v_1

e_0

K_1

y_0

y_0

$(12,12,\infty)$

$(26,22,\infty)$

worst case delay for $e_1 = 26$

u_2

J_1

calculat manually

e_1

v_1

$(5,7,\infty)$

$(22,29,\infty)$

g_0^1 → worst case delay for $g_1 = 32$

e_0

$\overline{K_1}$

$(32,30,\infty)$

nMOS delay: $(3,4,5)$

$(5,7,\infty)$

pMOS delay: $(5,6,7)$

$(5,7,\infty)$

y_0

$(5,7,\infty)$ b $(8,11,5)$

a → w → worst case delay = 12

a w

using simulate {worst case delay to 1 = 12

worst case delay to 0 = 12

$(5,7,\infty)$

$(12,12,\infty)$
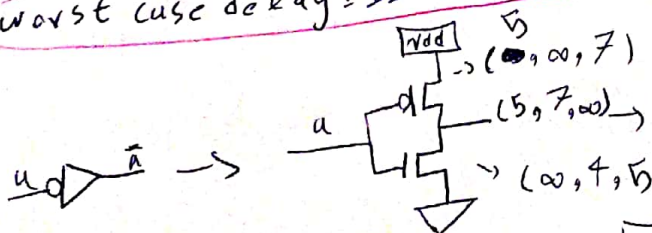
calculate manually

worst case delay = 12

$(8,7,12)$

calculate manualy

Vdd   → $(\infty,\infty,7)$

u → $\bar{A}$ → a $(5,7,\infty)$ →   worst case delay = 7   worst case delay = 7

$(\infty,4,5)$

worst case delay: to 1 = 5

to 0 = 7

use simulator   worst case delay

Top section:

a, b → w

worst case to 1 delay = 100 (crossed out)
worst case to 0 delay = 14
worst case delay = 14
↳ using simulator

$(\infty, 4, 5)$

Vdd

a → $(5, \infty, 7)$
d → $(10, \infty, 14)$

worst case delay = 14

w → $(10, 14, \infty)$

$(\infty, 4, 5)$

calculate manualy

Middle section:

a, b → w
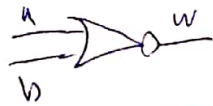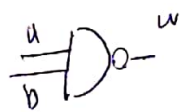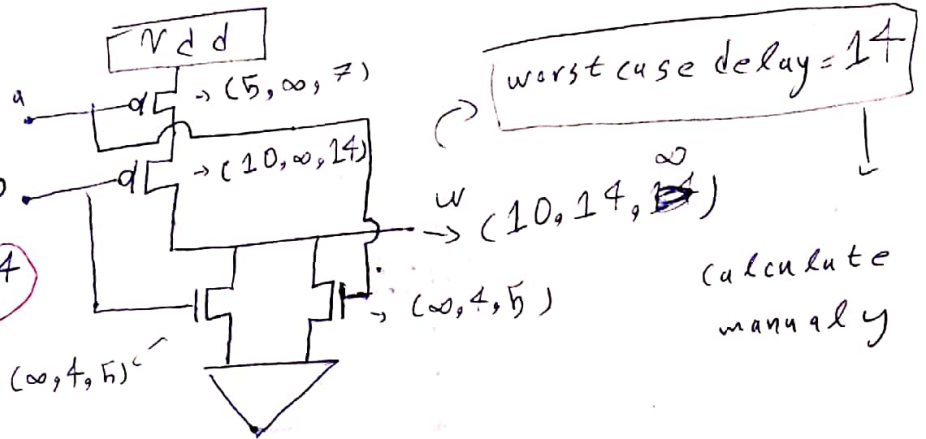
worst case to 1 delay = 10
worst case to 0 delay = 8 $(\infty, 8, 10)$
worst case delay = 10
↳ using simulator

$(5, \infty, 7)$ Vdd $(5, \infty, 7)$ b

a -d[[p- b

w   → $(10, 8, \infty)$ worst case delay = 10
↳ calculate manualy

→ $(\infty, 4, 5)$

Bottom section:

a, b, c → w

→ b

$(\infty, 22, 15)$ c

Vdd

a -d[[p- b

$(5, \infty, 7)$

$(15, 12, \infty)$ c

w

worst case delay = 15
↳ calculate manually

$(\infty, 8, 10)$

→ $(\infty, 4, 5)$
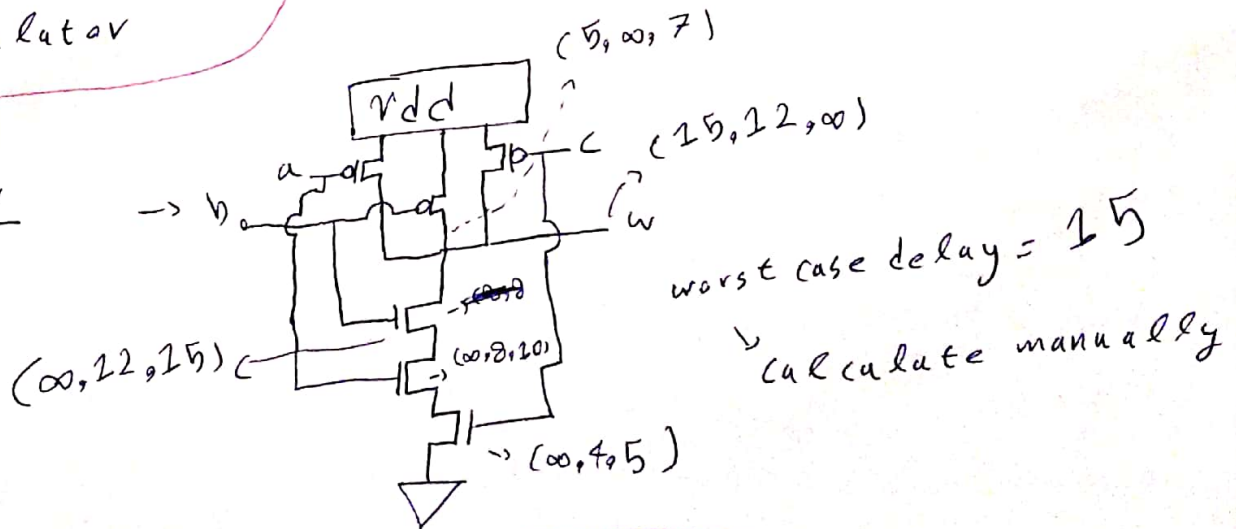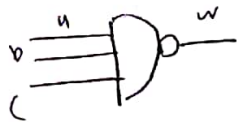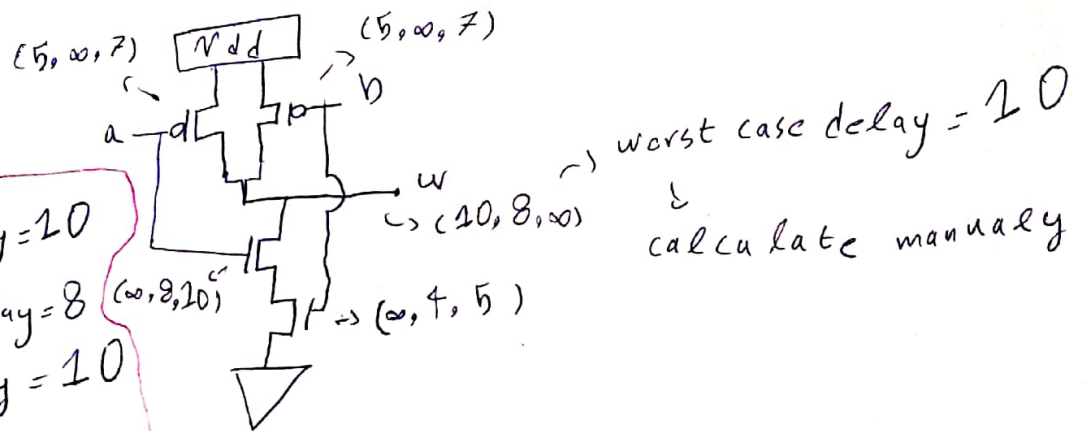
worst case to 1 delay = 15
worst case to 0 delay = 12
worst case delay = 15
↳ using simulator

$\overline{J_1}$ worst case to 0 delay = 12

$\overline{J_1}$ worst case to 1 delay = 12 $\Big\}$ manually

$\overline{J_1}$ worst case delay = 12

$\overline{J_1}$ worst case to 0 delay = 12

$\overline{J_1}$ worst case to 1 delay = 12 $\Big\}$ using simulator

$\overline{J_1}$ worst case delay = 12

$\overline{K_1}$ worst case to 0 delay = 19

$\overline{K_1}$ worst case to 1 delay = 22 $\Big\}$ manually

$\overline{K_1}$ worst case delay = 22

$\overline{K_1}$ worst case to 0 delay = 13

$\overline{K_1}$ worst case to 1 delay = 17 $\Big\}$ using simulator

$\overline{K_1}$ worst case delay = 17

e_1 to 0 worst case delay = 26

e_1 to 1 worst case delay = 22 } manually

e_1 worst case delay = 26

e_1 to 0 worst case delay = 26 ...

e_1 to 1 worst case delay = 22 } using simulator

e_1 worst case delay = 26

gate level e_1 worst case delay to 0 = 26

gate level e_1 to 1 worst case delay = 22 }

g_1 to 0 worst case delay = 30

g_1 to 1 worst case delay = 32 } manually

g_1 worst case delay = 32

g_1 to 0 worst case delay = 29

g_1 to 1 worst case delay = 22 } using simulator

g_1 worst case delay = 29

gate level g_1 to 0 delay = 30

gate level g_1 to 1 delay = 27