⑪ $y_1 = x_1 x_2$ $y_2 = \overline{x_1 x_2 \vee \overline{x_3}}$
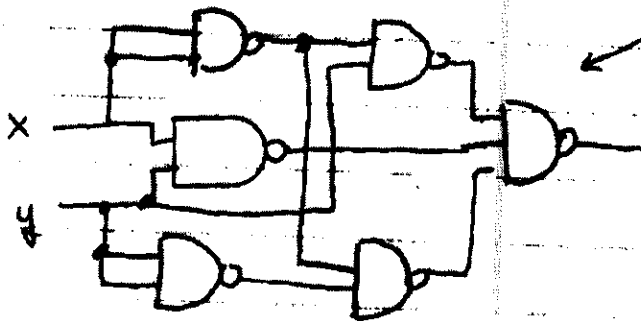
$y_3 = \overline{x_1 x_2 \vee \overline{x_3}}$ $x_1 x_2 \overline{x_3} x_4$ $y_4 = \overline{x_3} \wedge x_4$

⑭ ① $f(x,y) = xy \vee \overline{x}y \vee \overline{x}\overline{y}$

Already simplified
already removed

But
wait $f(x,y) = \overline{x} \vee y$

③ $f(x,y,z) = xyz \vee xy\overline{z} \vee x\overline{y}\overline{z} \vee \overline{x}\overline{y}z \vee \overline{x}y\overline{z}$
$\qquad = \overline{x}\,\overline{y} \vee xy \vee x\overline{z}$
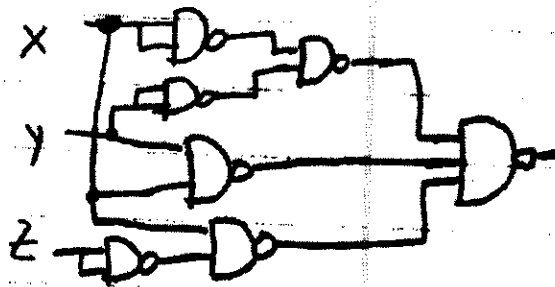
removed!

⑦ $f(x,y,z) = xyz \vee x\overline{y}\overline{z} \vee \overline{x}y\overline{z} = xyz \vee \overline{y}\overline{z}$
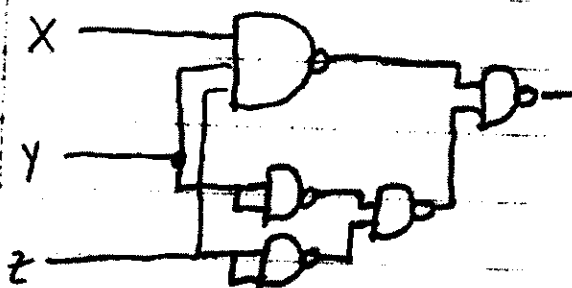
once again

already removed

11.5

(15) Design a half-adder circuit using only NAND gates
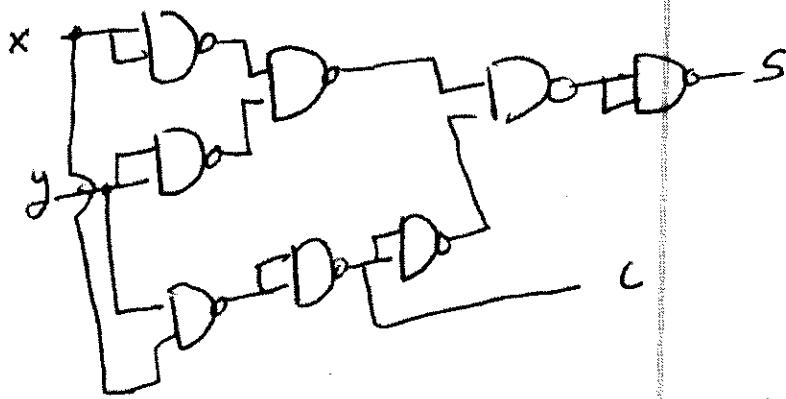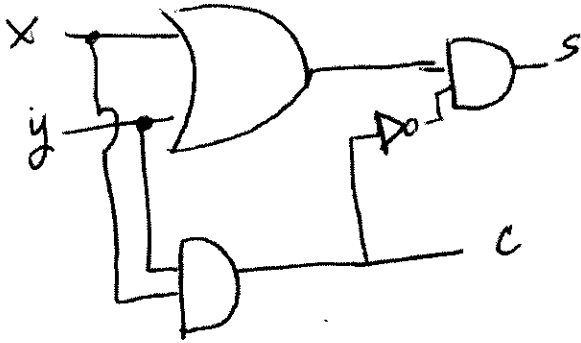
half adder using only NOR gates AB $\overline{\overline{A}+\overline{B}}$

(23)

(29) $11011 \rightarrow 00100$
                    $+1$
              $\boxed{00101}$