Mark Abraham — Assignment 3a — CS3510

(3.28*) 2SAT

(a)

$$(x_1 \vee \bar{x}_2) \wedge (\bar{x}_1 \vee \bar{x}_3) \wedge (x_1 \vee x_2) \wedge (\bar{x}_3 \vee x_4) \wedge (\bar{x}_1 \vee x_4)$$

SA = x_1 = true, x_2 = false, x_3 = false, x_4 = true

x_1 = true, x_2 = true, x_3 = false x_4 = true

~~x_1 = false x_2 = true x_3 = false x_4 = false~~

~~x_1 = false x_2 = false~~

~~x_1 = false x_2 = true~~

~~x_1 = true, x_2 = false x_3 = false~~

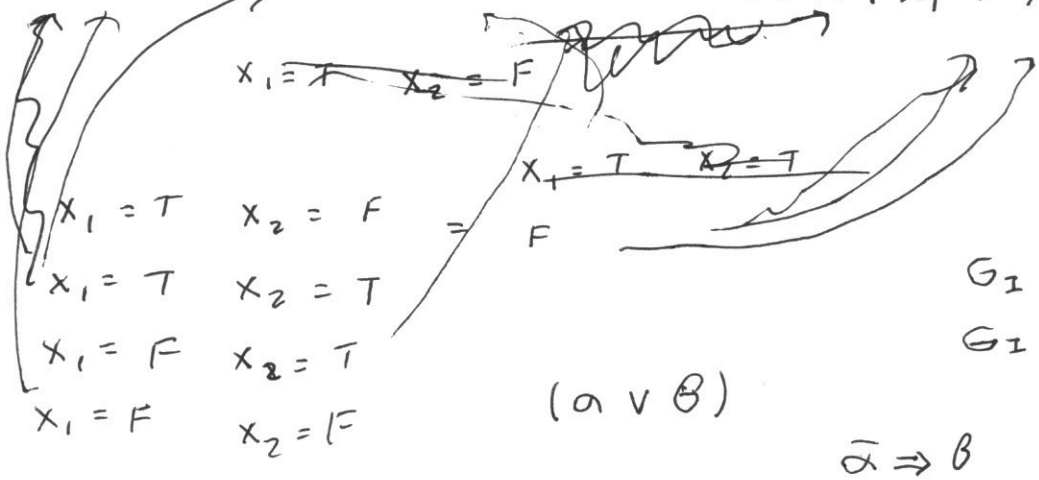
~~x_1 = true, x_2 = false, x_3 =~~

(b) finding the scc of a directed graph

~~$(x_1 \vee x_2) \wedge (\bar{x}_1 \vee \bar{x}_2)$~~

~~$(x_1 \vee x_2) \wedge (\bar{x}_1 \vee \bar{x}_2) \wedge (x_1 \vee \bar{x}_2) \wedge (\bar{x}_1 \vee x_2)$~~

$(x_1 \vee x_2) \wedge (\bar{x}_1 \vee \bar{x}_2) \wedge (x_1 \vee \bar{x}_2) \wedge (\bar{x}_1 \vee x_2) \wedge (x_3 \vee x_4)$



$(\alpha \vee \beta)$

$p \rightarrow q = \bar{p} \vee q$

$\bar{\alpha} \Rightarrow \beta$

$\bar{\beta} \Rightarrow \alpha$

$\bar{\alpha} \iff \beta$

$= (\bar{\alpha} \rightarrow \beta) \wedge (\beta \rightarrow \bar{\alpha})$

$= (\alpha \vee \beta) \wedge (\bar{\beta} \vee \bar{\alpha})$

n variables

m clauses

G_I 2n nodes (var + negation)

G_I 2m edges

(3.11)

```
def findCycle (v1, v2, G)
    // the edge e exists between v1 & v2
    // find edge e
    dfs(e, v1, v2)
    // is there a back edge to v1 ?
    if visited(e) AND visited(b) == false
    flag = True
repeat

if flag = True
    // cycle exists
else
    // no cycle
```