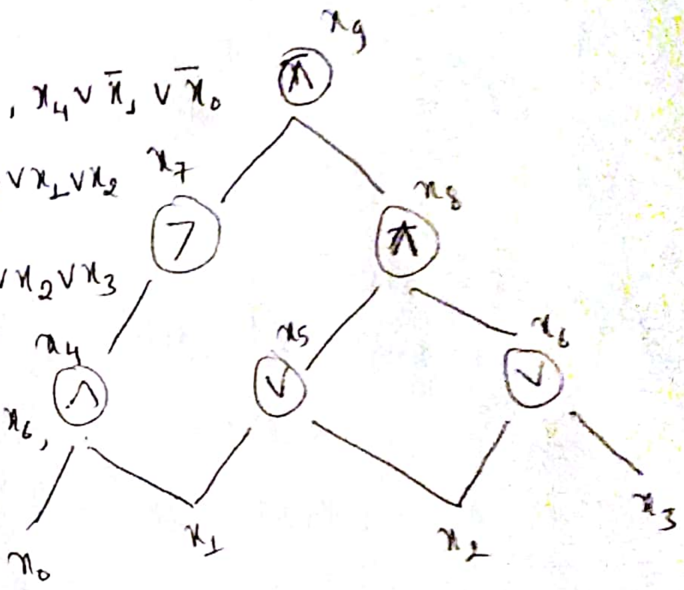
Ganesh Budhathoki

Problem #1



$x_4 = x_0 \wedge x_1 \Rightarrow$ add 3 clauses: $\bar{x}_4 \vee x_1,\ \bar{x}_4 \vee x_0,\ x_4 \vee \bar{x}_1 \vee \bar{x}_0$

$x_5 = x_1 \vee x_2 \Rightarrow$ add 3 clauses: $x_5 \vee x_1,\ x_5 \vee x_2,\ \bar{x}_5 \vee x_1 \vee x_2$

$x_6 = x_2 \vee x_3 \Rightarrow$ add 3 clauses: $x_6 \vee x_2,\ x_6 \vee x_3,\ \bar{x}_6 \vee x_2 \vee x_3$

$x_7 = \neg x_4 \Rightarrow$ add 2 clauses: $x_7 \vee x_4,\ \bar{x}_7 \vee \bar{x}_4$

$x_8 = x_5 \wedge x_6 \Rightarrow$ add 3 clauses: $\bar{x}_8 \vee x_5,\ \bar{x}_8 \vee x_6,$
$x_8 \vee \bar{x}_5 \vee \bar{x}_6$

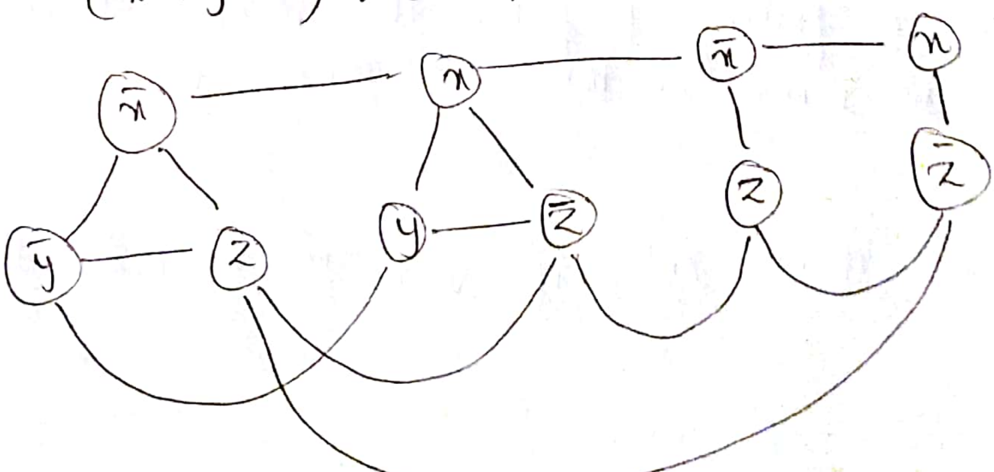
$x_9 = x_7 \wedge x_8 \Rightarrow$ add 3 clauses: $\bar{x}_9 \vee x_7,$
$\bar{x}_9 \vee x_8;\ x_9 \vee \bar{x}_7 \vee \bar{x}_8$

Hard code input values and output values

$x_0 = 1 \Rightarrow$ add 1 clause $\bar{x}_0$
$x_1 = 0 \Rightarrow$ add 1 clause $\bar{x}_1$
$x_9 = 1 \Rightarrow$ add 1 clause x_0

Problem #2.

$(\bar{x} \vee \bar{y} \vee z) \wedge (x \vee y \vee \bar{z}) \wedge (\bar{x} \vee z)(x \vee \bar{z})$



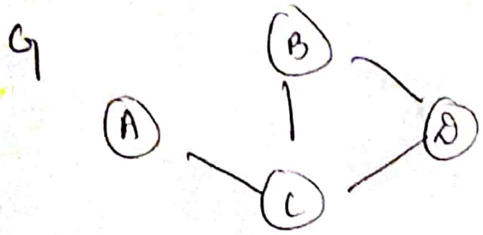
for $g = 4$, satisfying assignment

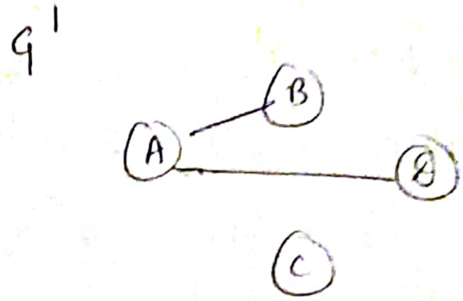
$x = 1$, $y = 0$, $z = 1$
$x = 0$, $y = 1$, $z = 0$
$z = 1$, $x = 1$
$z = 0$, $x = 0$

Yes, it has independent set of size $g = 4$ specified by transformation.

Scanned by CamScanner

3 Problem.





Applying Reduction,
In graph G', there is no clique of size 3, so, in Graph G there is no independent size of g = 3.
so, the instance is not an element of Clique.

4 Problem.

(a) A certificate is a set of nodes from the graph and the certifier return true if there is an edge between every pair of nodes otherwise returns fals.

(b) The given argument is failing to follow the recepie becacse the reduction is in the wrong direction. We must reduce clique to clique-3

(c) C is a vertex cover if and only if V-C is an independent set in G.