



to reduce a boolean formula to 3SAT

1. turn the formula into conjunctive normal form

$$(x_1 \vee \bar{x}_2) \wedge (x_1 \vee x_2 \vee \bar{x}_9 \vee \bar{x}_5 \vee x_{10}) \dots$$

2. turn CNF into 3-CNF

$$x_1 \longrightarrow x_1 \vee x_1 \vee x_1$$

$$x_1 \vee \bar{x}_2 \longrightarrow x_1 \vee \bar{x}_2 \vee \bar{x}_2$$

$$a \vee b \vee c \vee d \longrightarrow (a \vee b \vee \bar{z}) \wedge$$

$$(c \vee d \vee \bar{z})$$

$$a \vee b \vee c \vee d \vee e \longrightarrow (a \vee b \vee z_1) \wedge$$

$$(\bar{z}_1 \vee c \vee z_2) \wedge$$

$$(\bar{z}_2 \vee d \vee e)$$

Convert $\neg(a \vee b)$ to 3-SAT

$$\equiv \underline{\neg a} \wedge \underline{\neg b}$$

$$\equiv (\neg a \vee \neg a \vee \neg a) \wedge (\neg b \vee \neg b \vee \neg b)$$