SAT Worksheet

$$(\overline{x_1} \vee x_2 \vee x_4 \vee \overline{x_7}) \wedge (x_3 \vee \overline{x_5}) \wedge (\overline{x_2} \vee \overline{x_3} \vee x_4 \vee \overline{x_6} \vee x_8)$$

Find a satisfying truth assignment for the SAT instance above.
Empty values can be either true or false.

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8
	T	F		F			

$$(\overline{x_1} \vee T \vee x_4 \vee \overline{x_7}) \wedge \left(F \vee \overline{F}\right) \wedge \left(\overline{x_2} \vee \overline{F} \vee x_4 \vee \overline{x_6} \vee x_8\right)$$

$$T \wedge (F \vee T) \wedge (\overline{x_2} \vee T \vee x_4 \vee \overline{x_6} \vee x_8)$$

$$T \wedge T \wedge T$$

$$T$$

Reduce the SAT instance above to a 3SAT instance using the method described in class.

$\{\overline{x_1}, x_2, x_4, \overline{x_7}\} \rightarrow \{\overline{x_1}, x_2, \overline{v_1}\}, \{v_1, x_4, \overline{x_7}\}$

$\{x_3, \overline{x_5}\} \rightarrow \{x_3, \overline{x_5}, v_2\}, \{x_3, \overline{x_5}, \overline{v_2}\}$

$\{\overline{x_2}, \overline{x_3}, x_4, \overline{x_6}, x_8\} \rightarrow \{\overline{x_2}, \overline{x_3}, \overline{v_3}\}, \{v_3, x_4, \overline{v_4}\}, \{v_4, \overline{x_6}, x_8\}$

Find a satisfying truth assignment for the 3SAT instance.

$$(\overline{x_1} \vee x_2 \vee \overline{v_1}) \wedge (v_1 \vee x_4 \vee \overline{x_7}) \wedge (x_3 \vee \overline{x_5} \vee v_2) \wedge (x_3 \vee \overline{x_5} \vee \overline{v_2}) \wedge (\overline{x_2} \vee \overline{x_3} \vee \overline{v_3}) \wedge (v_3 \vee x_4 \vee \overline{v_4}) \wedge (v_4 \vee \overline{x_6} \vee x_8)$$

x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	v_1	v_2	v_3	v_4
	T	F		F				T		T	T

$$(\overline{x_1} \vee T \vee \overline{v_1}) \wedge (T \vee x_4 \vee \overline{x_7}) \wedge (F \vee T \vee v_2) \wedge (F \vee T \vee \overline{v_2}) \wedge (F \vee T \vee F) \wedge (T \vee x_4 \vee F) \wedge (T \vee \overline{x_6} \vee x_8)$$

$$T \wedge T \wedge T \wedge T \wedge T \wedge T \wedge T \equiv T$$