WHAT OF CLAUSES LIKE:

$\underline{(x_1)} \equiv (x_1 \vee f_1 \vee f_2)$

$\underline{(x_2 \vee x_3)} \equiv (x_2 \vee x_3 \vee f_1)$

SAY WE HAD TWO NEW VARS
THAT WE $\underline{\underline{\text{KNEW}}}$ WERE FALSE f_1 and f_2

ADD $\sim f_1 \wedge \sim f_2$ SOMEHOW?

ADD m that is unconstrained

FIRST TRY: $(\underline{\sim f_1 \vee \sim f_2 \vee m}) \wedge (\underline{\sim f_1 \vee} \sim f_2 \vee \sim m)$

ADD m_2 that is unconstrained

$\left.\begin{array}{l}(\sim f_1 \vee m \vee m_2) \wedge (\sim f_1 \vee m \vee \sim m_2) \wedge \\ (\sim f_1 \vee \sim m \vee m_2) \wedge (\sim f_1 \vee \sim m \vee \sim m_2)\end{array}\right] \Rightarrow f_1 \text{ is } F$

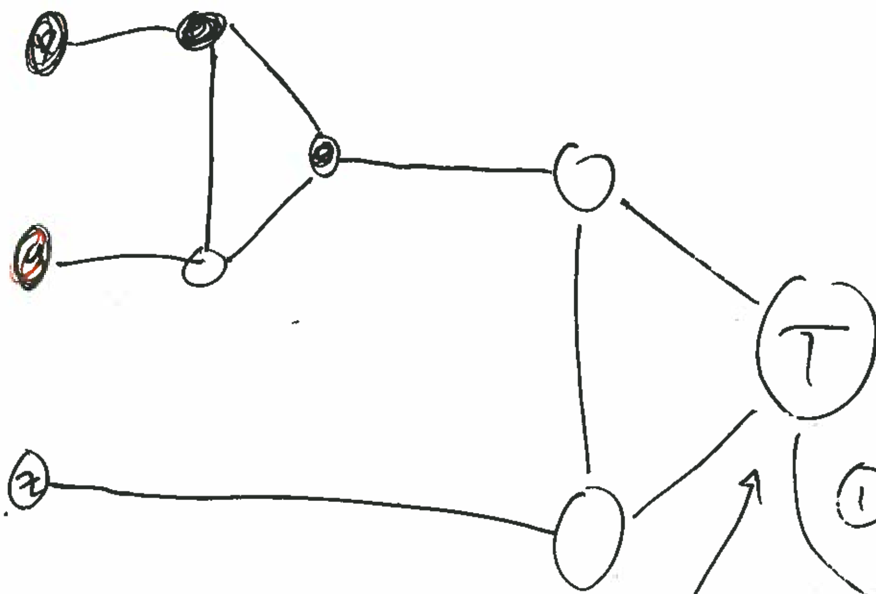
ADD similar clauses for f_2

TO SHOW: The SAT instance is solvable iff the corresponding 3SAT instance is solvable.
TRUE BASED ON LOG EQUIV.

CPSC 320

2010/04/06

T F

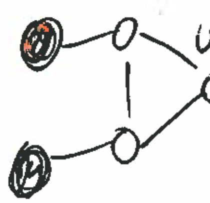


THIS IS A 3-VAR CLAUSE

BUT:

(1) HOW DO WE ENFORCE THAT VAR NODES ARE NOT "M" COLOURED?

4

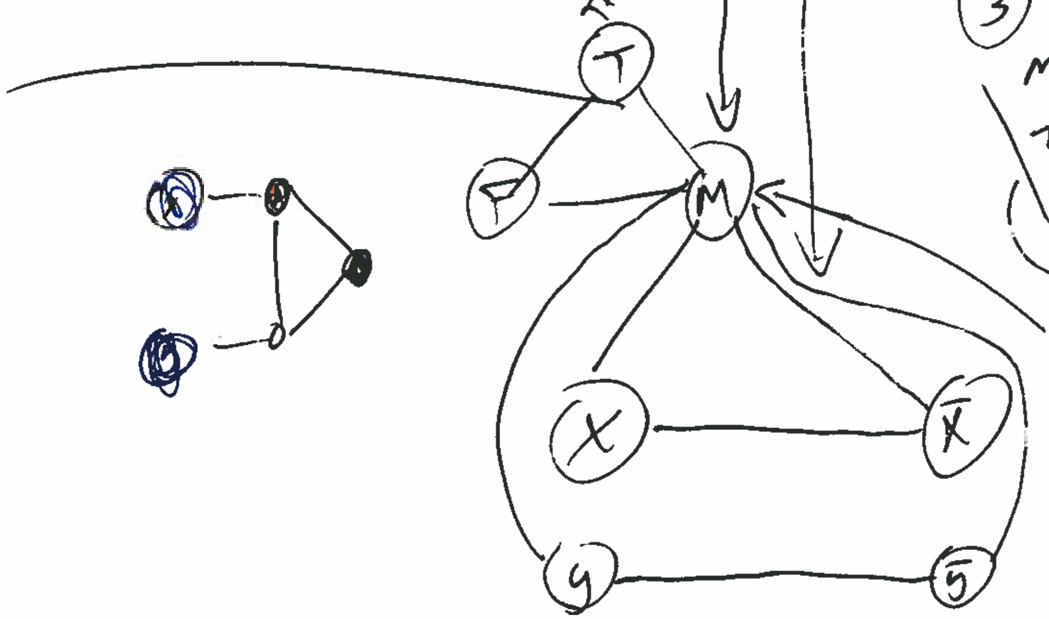


(2) WHAT ABOUT CONSTRAINT THAT $X \neq \overline{X}$?

(3) HOW DO WE MAP ~~TO~~ TRUTH TO COLOUR "CORRECTLY"?

LOOK UP T, M, + F ON THESE NODES

THIS IS THIS NODE



CPSC 320
2010/04/06

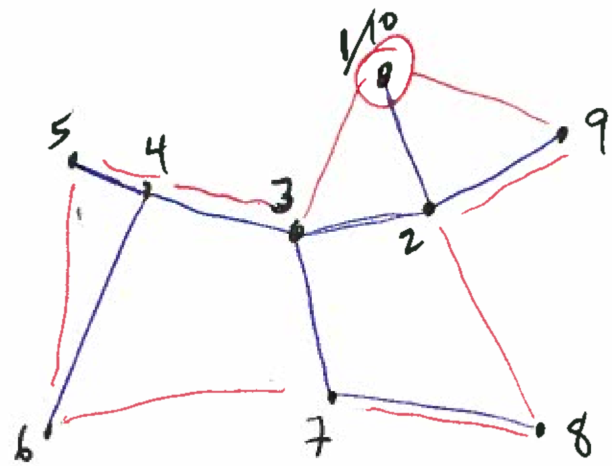
ΔTSP: FIND A MIN-COST TOUR MCT

IN A GRAPH THAT OBEYS THE "TRIANGLE INEQUALITY"

NP-COMPLETE

$$d(x,z) \le d(x,y) + d(y,z)$$

i.e., IT'S AT LEAST AS CHEAP TO GO DIRECT AS TO CONNECT.



NOT MIN-COST TOUR.

MST

IS MCT AN MST?

NO, TOO EXPENSIVE B/C IT HAS A CYCLE.

$$w(MCT) \ge w(MST)$$

PROPOSED APPROX: ~ GO OUT AND BACK ALONG MST. ⇒ COST IS $2x\ w(MST)$

NOT A TOUR B/C IT REPEATS NODES

"POT"

EVERY TIME WE "SKIP" A REPEATED NODE, WE TAKE A Δ-INEQ. SHORTCUT ⇐

VISIT MST W/A PRE-ORDER TRAVERSAL + GO BACK TO THE ROOT.

$w(POT) \le 2w(MST) \le 2w(MCT)$

(8)