HW 11 CMSC 452. REALLY DUE Nov 25

(NOTE- since Thursday is not a school day REALLY need to hand the HW in on Nov 25.)

1. (30 points) Let $\phi(x_1, x_2, x_3, x_4)$ be

$$ (x_1 \lor \neg x_2 \lor x_3 \lor x_4) \land (x_2 \lor x_3) \land (\neg x_3 \lor x_4) $$

Draw the graph you get out of the reduction $CNF - SAT \leq_p 3COL$
You MAY use a box with inputs and outputs for the gadget that you need.

2. (30 points) Let $A \in NP$ and $B \in P$, poly $p$, such that

$$ A = \{x \mid (\exists y)[|y| = p(|x|) \land (x, y) \in B]\}. $$

In the proof that $A \leq SAT$ you need to create a subformula for every instruction in the Turing machine for $B$. Assume the Turing machine for $B$ had the instruction

$$ \delta(q, a) = (p, R) $$

Give the subformula for that instruction.

3. (40 points) In the proof of the Cook-Levin theorem we said that if a part of the tape was not close to the head (the part that had something like $(q, a)$) then it would NOT change. Write the subformula that reflects this.