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

$$(x_1 \vee \neg x_2 \vee x_3 \vee x_4) \wedge (x_2 \vee x_3) \wedge (\neg x_3 \vee x_4)$$

   Draw the graph you get out of the reduction $CNF - SAT \leq_m^p 3COL$

   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

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

   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.