HW 8 BENMA

4a. $KB = \{(A \vee B) \to C, A\}$

$\neg(A \vee B) \vee C \vee A$

$\cancel{(\neg A \wedge C) \vee (\neg B \wedge C) \vee A}$

$\cancel{\{A \to C, B \to C, A\}}$

$(\neg A \wedge \neg B) \vee C \vee A$

$\underbrace{(\neg A \vee C) \wedge (\neg B \vee C) \vee A}_{CNF}$

$\{(A \to C) \wedge (B \to C), A\}$

resolution $A \to C, A \Rightarrow C$

So we can derive $\{C\}$

4b. $KB = \{A \vee B, B \to C, (A \vee C) \to D\}$

CNF: $\neg B \vee C$ $\quad \neg(A \vee C) \vee D \to (\neg A \vee D) \wedge (\neg C \vee D)$

resolution

$(A \vee B \vee \neg B \vee C) \vee \sim(A \vee C) \vee D$

$(A \vee C) \vee \sim(A \vee C) \vee D$

D

We can derive $\{D\}$

5b. 1. Try to prove there is no finite model where all 7 formulas are consistent

2. Suppose number n has predecessor p and successor s

$p_1 < p_2 < p_3 \cdots < p_i < n < s_1 < s_2 < s_3 \cdots < \boxed{s_i} \to$ no successor

also suppose we have finite set of $2i+1$ numbers from above

3. According to the formula 1, s_i has exactly one successor and not equal to s_i and according to formula 6, s_i must be greater than itself because there's no successor available

4. Above does not satisfy formula 7 (A number is not larger than itself)