CS686 A2

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1 Question 1

1.
   - The Money is under the first box.
   - If the money is under the first box. Then the first label is false, the second label is **true** and the third label is false.
   - If the money is under the second box. Then the first label is **true**, the second label is false and the third label is **true**.
   - If the money is under the third box. Then the first label is **true**, the second label is **true** and the third label is false.
   - Since one and only one of these labels is true, the money muse be under the first box.
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2.
   - KB: A, B, C
   - A : Money is in Box 1.
   - B : Money is in Box 2.
   - C : Money is in Box 3.
3.
   - There is one and only one of labels is **true**. If one is **true**, the other two must be **false**
   - P1: $\neg A$
   - P2: $\neg B$
   - P3: B
   - so We have...
   - $\neg A \rightarrow \neg(\neg B) \wedge \neg B$ which is $\neg A \rightarrow B \wedge \neg B$
   - $\neg B \rightarrow \neg(\neg A) \wedge \neg B$ which is $\neg B \rightarrow A \wedge \neg B$
   - $B \rightarrow \neg(\neg A) \wedge \neg(\neg B)$ which is $B \rightarrow A \wedge B$

   CNF: $\{(A \vee (B \wedge \neg B) \wedge (B \vee (A \wedge \neg B)) \wedge (\neg B \vee (A \wedge B))\}$
   CNF: $\{\{A, B\}, \{A, \neg B\}, \{B, A\}, \{B, \neg B\}, \{\neg B, A\}, \{\neg B, B\}\}$

4. $\{(A \vee (B \wedge \neg B), (B \vee (A \wedge \neg B)), (\neg B \vee (A \wedge B))\}$
   Resolve $\{A, B\}, \{A, \neg B\}$ gives $\{A\}$
   Resolve $\{B, A\}, \{B, \neg B\}$ gives $\{A, B\}$
   Resolve $\{\neg B, A\}, \{\neg B, B\}$ gives $\{A, \neg B\}$
   We can get $\{\{A\}, \{A, B\}, \{A, \neg B\}\}$
   Resolve $\{A, B\}, \{A, \neg B\}$ gives $\{A\}$
   We can get A, A
   And it returns A
   Therefore, money is under the first box