中正大學 105 學年度碩士班甄試
哲學系 -邏輯

- In the following questions, we will use (1) $\sim$ as "negatio, (2) $\wedge$ as "conjunction", (3)$\vee$ as "or", (4) $\rightarrow$ as "implication", and (5)$\leftrightarrow$ as "equivalence", (6) (x) as "for all x", (7) $(\exists x)$ as "for some x", and $\therefore$ for "therefore" in an argument.
- If you want to answer the questions with the symbols you are familiar with, explicitly state the intended meaning of the symbols you are using.
- When proving, you can use the proof system that you are familiar with, but specify the source of your proof system (from which book and who is the author).

1. Translate the following English sentences into well-formed formulas, with English alphabets standing for *atomic sentences* - that is, those sentences that are not built up out of other sentences.(10pts)
   (a) If Sam will come to the party or Max will not, then Sam will not come to the party and Max will enjoy himself.
   (b) Mary goes to the movies only if a comedy is playing.

2. Use truth table method to show the validity of the following argument. (10pt)
   1. $(A \wedge B) \vee D$ 2. $\sim A \wedge \sim B$ $\therefore D$.

3. Prove that the following argument is a valid argument (no semantic method).(10pt)
   1. $A \rightarrow B$ 2. $\sim B \vee C$ 3. $\sim C$ $\therefore \sim A$.

4. Translate the following sentences into well-formed formulas in first-order logic. (30pts)
   (a) No one who is persistent can't learn logic
   (b) John loves someone who does not love himself.
   (c) Everyone loves somebody and no one loves everybody, or somebody loves everybody and someone loves nobody.

5. Prove the validity of the following arguments. (20pt)
   (a) 1. $(x)[Fx \rightarrow Gx]$
   2. $(x)[Gx) \rightarrow Hx]/\therefore (x)(Fx \rightarrow Hx)$

   (b) 1. $(x)(\exists y)Fxy \rightarrow (x)(\exists y)Gxy$
   2. $\sim(x)(\exists y)Gxy/\therefore (\exists x)(y)\sim Fxy$

6. Show that the following arguments are invalid (10pt)
   (a) 1. $(x)(Px \rightarrow Qx)$
   2. $(x)(Qx \rightarrow Rx)/\therefore (x)(Px \wedge Rx)$

7. (10pt)
   For sets A, B, C, prove that if A is a subset of B, and B is a subset of C, then A is a subset of C.

Answer Key for Exam A

- In the following questions, we will use (1) $\sim$ as "negatio, (2) $\wedge$ as "conjunction", (3)$\vee$ as "or", (4) $\rightarrow$ as "implication", and (5)$\leftrightarrow$ as "equivalence", (6) (x) as "for all x", (7) $(\exists x)$ as "for some x", and $\therefore$ for "therefore" in an argument.
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   Answer:

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   (a) 1. $(x)[Fx \rightarrow Gx]$
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Answer: 稍後。

6. Show that the following arguments are invalid (10pt)
   (a) 1. $(x)(Px \to Qx)$
   2. $(x)(Qx \to Rx) / \therefore (x)(Px \wedge Rx)$

   Answer: 稍後。

7. (10pt)
   For sets A, B, C, prove that if A is a subset of B, and B is a subset of C, then A is a subset of C.

   Answer: 稍後。