Kerry Ojakian's CSI 30 Class
Class Assignment #4

1. Suppose you are given the following premises:

   $$P \to Q, \quad A \to P, \quad A$$

   Conclude Q, by giving a structured proof where each line is justified by a named inference rule.

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2. Suppose you are given the following premises:

   $$P \to Q, \quad A \to P, \quad \neg Q$$

   Conclude $\neg A$, by giving a structured proof where each line is justified by a named inference rule.

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3. Suppose you are given the following premises:

$$\neg X, \quad P \wedge Q, \quad P \to (X \vee Y)$$

Conclude Y, by giving a structured proof where each line is justified by a named inference rule.

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4. Suppose you are given the following premises:

$$P \to \forall x \ A(x), \quad \neg A(c),$$

Conclude $\neg P$, by giving a structured proof where each line is justified by a named inference rule.

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5. Suppose you are given the following premises:

$$(\exists x A(x)) \to (\forall y B(y)), \quad A(c)$$

Conclude $B(c)$, by giving a structured proof where each line is justified by a named inference rule.

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6. Suppose you are given the following premises:

   (a) "It is sunny"

   (b) "If it is sunny then it is daytime"

   (c) "If it is daytime then you should study"

   Conclude from these premises that "You should study". Do this by translating the phrases into formal logic. Then give a structured proof where each line is justified by a named inference rule.

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7. Suppose you are given the following premises:

   (a) "NYC is not the best city in the world"

   (b) "If there were no homeless in NYC, then NYC would be the best city in the world"

   (c) "If there are homeless in NYC, then taxes in NYC should increase"

   Conclude from these premises that "Taxes in NYC should increase". Do this by translating the phrases into formal logic. Then give a structured proof where each line is justified by a named inference rule.

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8. Suppose you are given the following premises:

   (a) "BCC is a university"

   (b) "Every university is on earth"

   Conclude from these premises that "BCC is on earth". Do this by translating the phrases into formal logic (using quantifiers), using the following predicates (whose domain are all buildings): $U(x)$ says "x is a university" and $E(x)$ says "x is on earth". Give a structured proof where each line is justified by a named inference rule.

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9. Suppose you are given the following premises:

   (a) Every person is either politically engaged or rich (or both)

   (b) Bob is not rich.

   Conclude from these premises that Bob is politically engaged. Do this by translating the phrases into formal logic (using quantifiers), letting $P(x)$ mean "x is politically engaged" and $R(x)$ mean "x is rich".
