12A: Problem Set 1

Due date: **Sept 1, 10am**. Reminder: late problem sets do not receive credit. Please write your GSI's name in the top right corner of your problem set.

1. For each of the following arguments, answer the following: (i) Is the argument valid? (ii) Is the argument sound? (iii) Does the argument have a true conclusion?

   (a) If the capital of France is not Paris, the capital of Germany is Berlin.
   The capital of Germany is not Berlin.
   So, the capital of France is Paris.

   (b) Barack Obama is a bachelor and is good at tennis.
   So, Barack Obama is a bachelor.

   (c) Barack Obama is a bachelor.
   So, if Obama is a not a bachelor, then he is not a bachelor.

   (d) If Alaska is the largest state, then no state is larger than Alaska.
   Tiramisu is a kind of dessert.
   Alaska is the largest state.
   So, no state is larger than Alaska.

   (e) If Alaska is the largest state, then no state is larger than Alaska.
   No state is larger than Alaska.
   So, Alaska is the largest state.

   (f) Philosophy is taught at Berkeley.
   So, the iPhone has a color screen.

   (g) Philosophy is taught at Berkeley.
   The iPhone has a color screen.
   So, the iPhone has a color screen.

   (h) Hydrogen is the lightest element on the periodic table.
   So, Steve Wozniak exists or he does not exist.

2. The following arguments are not valid. For each of these arguments, provide a sentence which is such that, when you add it to the premises, the resulting argument is valid. (In other words, your task is to provide, for each argument, an additional premise which "fixes" the argument.)

   (a) *Lost* was the most addictive television show in history.
   So, sugar dissolves in acetone.

   (b) Dogs like dog food or cats like dog food.
   So, cats like dog food.

   (c) If Jane does what is good for her, she studies logic.
   So, Jane studies logic.

   (d) Any man who compares himself to a god is a narcissist.
   So, Kanye is a narcissist.

3. True or false?

   (a) If the premises of an argument are all tautologies, then the argument is valid.

   (b) If an argument contains a contradiction as a premise, then it is valid.

   (c) If the conclusion of an argument is a tautology, then it is valid.

   (d) It is possible for an argument to be valid even if its conclusion is a contradiction.

   (e) One set can contain another set as a member.

   (f) B is a member of the set $\{A, \{B, C\}\}$.

   (g) $\{\emptyset\}$ is the empty set.

   (h) $\{A\}$ is a singleton set which contains A as its only member.

   (i) $\{A, \{B, C\}\}$ is a set with two members.

   (j) $\{A, \{B, C\}\}$ and $\{\{B, C\}, A\}$ are distinct (nonidentical) sets.

   (k) $\{E, F\} \in \{D, \{E, F\}\}$ and $E \notin \{D, \{E, F\}\}$.

   (l) If a given set of premises—call this set P—does not entail a given conclusion C, then the set which contains the members of P together with C is inconsistent.