Extra Deductive Logic Set

If you did badly on the first problem set, not to worry! You can get up to 10 points of extra credit by completing this Extra Logic Set and e-mailing your solutions to me by Friday the 14th at 8pm — *dhoek@princeton.edu*. *This problem sheet is compulsory for those who enrolled in the course late, and so didn't hand in a solution to Problem Set 1 before the deadline. Answer in full sentences.*

1. [Only for late enrollers] Define each of the following terms as accurately as you can. Use your own words, and give examples where helpful.
   a. **Proposition**
   b. **Disjunction**
   c. **Validity**
   d. **Argument**
   e. **Intersection**
   f. **Soundness**
   g. **Premise**
   h. **Inductive Reasoning**
   i. **Additivity**
   j. **Entailment**
   k. **Conditional Probability**

2. Almost all of these arguments are invalid. Find the valid ones, and for each invalid argument, describe a possible situation in which the premises are true, and the conclusion is false.
   a) Many ordinary people are corrupt, and politicians are ordinary people. So, some politicians are corrupt.
   b) Everyone who admires Bach loves the *Goldberg Variations;* some who admire Chopin do not love the *Goldberg Variations;* so some admirers of Chopin do not admire Bach.
   c) Some nerds are trainspotters. Some nerds wear parkas. So some trainspotters wear parkas.
   d) Anyone who is good at logic is good at assessing philosophical arguments. Anyone who is mathematically competent is good at logic. Anyone who is good at assessing philosophical arguments admires Bertrand Russell. Hence no-one who admires Bertrand Russell lacks mathematical competence.
   e) Everyone who is not a lunatic can do logic. No lunatics are fit to serve on a jury. None of your cousins can do logic. Therefore none of your cousins is fit to serve on a jury.
   f) Few Sicilians approve of abortion; many atheists approve of abortion; so few atheists are Sicilians.
   g) All logicians are rational; no existentialists are logicians; so if Sartre is an existentialist, he isn't rational.
   h) If Sartre is an existentialist, he isn't rational; so if he is irrational, he is an existentialist.

3. Say whether each of the following claims is true or false. Explain your answers.

   a) If someone produces an invalid argument, there is no possible situation in which the premisses are true and the conclusion false.

   b) If an argument has false premisses and a true conclusion, then the truth of the conclusion can't really be owed to the premisses: so the argument cannot really be valid.

   c) Any inference with actually true premisses and a true conclusion must be truth-preserving and so valid.

   d) If the conclusion of an argument is false and all its premisses are true, then the argument cannot be deductively valid.

   e) You can make a valid inference invalid by adding extra premisses.

   f) You can make a sound inference unsound by adding extra premisses.

   g) You can make an invalid inference valid by adding extra premisses.

4. The **negation** or **complement** ¬P of a proposition P is the proposition that is true in all possible situations where P is false, and false in all possible situations where P is true. For each of the following claims, find a natural way to express its negation in English.

   a) No one loves Jack.

   b) Only unmarried men love Jill.

   c) Everyone who loves Jack admires Jill.

   d) Someone loves both Jack and Jill.

   e) Jill always arrives on time.

   f) Whoever did that ought to be prosecuted.

   g) Whenever it rains, it pours.

   h) No one may smoke.