Assignment 3
CIS 471/571 Introduction to Artificial Intelligence, Fall 2018
due 11:59 pm, Monday, October 29th

1. Please specify each of following sentences is correct or not, why?
a. $(B \Leftrightarrow A) \vDash (A \wedge B)$
b. $\neg(A \Rightarrow B) \vee (A \wedge B)$ is satifiable.
c. $(Fire \Rightarrow Smoke) \Rightarrow (\neg Smoke \Rightarrow \neg Fire)$ is valid.
d. $\forall x\ Smart(x) \vee (x \vee \neg x)$ is valid.
e. $\exists x\ play\_Football\_for(x,\ UO) \Rightarrow Champion(x)$
f. $\forall x\ \neg(\neg play\_Football\_for(x,\ UO) \vee \neg Champion(x))$
g. $(\forall x\ Likes(x, Broccoli) \wedge \neg has\_Cancer(x)) \Leftrightarrow$
$(\neg\forall x \neg Likes(x, Broccoli) \vee has\_Cancer(x))$

2. Assume you have a manufacturing process for the creation of Google cars. There are 2000 different parts that are combined together to make a Google car. There are many different versions of these parts, however, and not all versions of parts are compatible with each other. A knowledge base is created that lists all the rules for the allowable combinations of versions of parts, and it is written entirely in Horn form. Which technique would be the best (resolution, backward chaining, or forward chaining) for asking the knowledge base if a particular combination of 20 parts is allowed? Justify your answer.

3. Suppose there is a policy at the University of Ducks that any student who plans to finish a degree in Science major must get good score from at least one Math course. A student football player, Justin, who is in Science Major and takes the Calculus course. The instructor of the Calculus course give good scores to all students who take the course. Calculus is a Math course. First, use first order logic sentences (including any "common sense" sentences) to represent all knowledge mentioned above. Based on the knowledge, will Justin finish a degree in Science Major? If yes, use both backward chaining and resolution to prove your answer. If not, also use both backward chaining and resolution to prove it. If you cannot make a conclusion, please explain why.

To turn in by Canvas/emails: If you are in **CIS 471**, submit your answers on **Canvas**. If you are in **CIS 571**, email to **dou@cs.uoregon.edu**. We prefer that you send in a pdf file. If you are using Word, you should be able to convert your word file to a pdf file.