Guideline

Homework for week 03.

Please submit your solutions in a single PDF on Brightspace.

If you are writing by hand, please ensure your handwriting is legible.

Multiple submissions are possible before the due time; the last submission will be graded.

Exercise 1 (points = 50)

Below are some arguments. For each argument, determine whether or not it is valid. If it is valid, your answer needs to be "Valid". If it is invalid, your answer needs to be "Invalid". Explanation is not needed.

A.

1. If Jane has a cat, then Jane has a pet
2. Jane has a cat
3. Therefore, Jane has a pet

B.

1. If Jane has a cat, then Jane has a pet
2. Jane has a pet
3. Therefore, Jane has a cat

C.

1. If Jane has a cat, then Jane has a pet
2. It is not the case that Jane has a pet
3. Therefore, it is not the case that Jane has a cat

D.

1. If Jane has a cat, then Jane has a pet
2. It is not the case that Jane has a cat
3. Therefore, it is not the case that Jane has a pet

E.

1. If pigs fly, then hell has frozen over
2. Pigs fly
3. Therefore, hell has frozen over

F.

1. I like chocolates
2. Therefore, We like chocolates

G.

1. If the Professor is sick, the class will be canceled
2. If the class is canceled, the students will be happy
3. Therefore, if the Professor is sick, students will be happy

H.

1. If Rufus is a human being, then Rufus has a right to life
2. It is not the case that Rufus is a human being
3. Therefore, it is not the case that Rufus has a right to life

I.

1. Amy joins the Army, or Mary joins the Marines
2. It is not the case that Mary joins the Marines
3. Therefore, Amy joins the Army

J.

1. I like Bulgogi
2. Therefore, I like Bibimbap and Bibimbap

Exercise 2 (points = 25)

Rewrite the statements below using quantifiers and variables. For example, a statement like "Even numbers are divisible by 2" becomes: "for each even number n, n is divisible by 2", or "for each number n, if n is an even number, then n is divisible by 2". You do not necessarily need to use the exact words or patterns as above but you do need to figure out the hidden quantifiers from the English meaning of each sentence.

1. No two leaves are alike.
2. Even integers equals twice some integer.
3. The sum of two positive integers is a positive number.
4. Everyone loves ice cream.
5. All that glitters is not gold.

Exercise 3 (points = 25)

Use inference rules to show the following argument is valid. To assist your writing, you can provide a list of sentences that look like this: `From "...", we have "..." following "..."`. Example: From premises "p" and "p->q", we have "q" following the inference rule "Modus Ponens".

Premises

- p ∨ q
- q -> r
- p ∧ s -> t
- ~r
- ~q → u ∧ s

Conclusion

- t