Just a sentence is required for each answer. Remember: the purpose of the assignment is to prepare you for the tutorial.

Please note: everything you need to complete the homework (theoretically) is in ‘Handout1 – Barest basics of deductive logic’. If you struggle with anything, don’t worry, as we’ll cover these questions in the tutorials

**Arguments**

1. Without simply copying and pasting the definition from the handout, in your own words, describe what it is for an argument to be valid.
2. Explain what the difference is between an argument being valid, and an argument being sound.
3. Can arguments be **true**?
4. Give an example of an argument with two premises **and** a conclusion which is logically valid but has a false conclusion.  If you don’t think this is possible, explain why.
5. Is the following argument valid? Explain your answer.

P1. Today is Thursday

P2. Tomorrow is Friday

C. 2+2=4

1. Can you ever give a valid argument with a conclusion that is *contradictory*?

**Propositional Logic**

1. Translate the following sentence into propositional logic: ‘It is raining, or it is not raining’.
2. Draw up a truth table for your translation.
3. *Modus ponens* is a valid form of inference, of the following form:

P1. If A, then B

P2. A

C. B

(1) First of all, substitute the English words in P1. for the correct logical connective

(2) Draw a *single* truth table for both the premises and the conclusion

(3) Demonstrate, using only the truth table, that the argument is indeed valid

1. Consider the following argument:

P1. If it rains, then the floor gets wet

P2. The floor is wet

C. It has rained

(1) First of all, translate the sentence into propositional logic.

(2) Again, draw a single truth table for both the premises and the conclusion

(3) Demonstrate, using only the truth table, that the argument is either valid or invalid

***Bonus question***: this argument form appears on the handout. What is its Latin name?

1. The ‘→’ symbol is called the *conditional*. Its English language equivalent is ‘if… then’. The ‘↔’ symbol is called the *biconditional*. Its English language equivalent is ‘if and only if’ (often shortened to ‘iff’). (‘If p then q’, and ‘if q then p’) is logically equivalent to (‘p iff q’). Can you demonstrate this fact with a truth table?
2. Construct your own valid argument, with true premises, and translate the argument into propositional logic.
3. Construct your own invalid argument, with true premises *and* a **true** conclusion, and translate that argument into propositional logic.

**Propositional Logic (difficult)**

1. Translate into *predicate logic* (note: *not* propositional logic) the sentence: ‘the ball is red’
2. Now try translating ‘all balls are red’.
3. Give a truth table for the following sentence: ((P -> Q) v Not-(P (Q -> P) & (P -> not-Q))