

Question 1 [12 Points]

Express each of the following English sentences in FOPC

1. a student will pass an exam if the student takes the exam and the student studies for the exam

2. only yellow birds, that like cats, sing

3. no student has a small shop in Amman

4. every student, who does not go to the lab L, has a computer

Note that **L** is the name of the lab, it is a constant

Question 2 [3 Points]

Indicate whether each of the following statements is true (T) or false (F)

1. _____ 2. _____ 3. _____

1. $\neg(\forall x)(A(x) \rightarrow (B(x) \vee C(x)))$ is equivalent to $(\exists x)(A(x) \& \neg B(x) \rightarrow \neg C(x))$

2. $\neg(\exists x)(A(x) \rightarrow (B(x) \& C(x)))$ is equivalent to $(\forall x)(A(x) \& (B(x) \rightarrow \neg C(x)))$

3. $(\forall x) (A(x) \& D(X) \rightarrow B(X))$ is equivalent to $(\forall x) (\neg B(x) \rightarrow (A(X) \rightarrow \neg D(x)))$