Cairo University
Faculty of science
Mathematics Department
30 min.

Mid Term 2 Exam(Spring 2018)
Artificial Intelligence
(Comp408)

Name:---------- ID: ----------

The Quiz is in **TWO** pages:

Q1) What does it mean that FOL is semidecidable, how does that affect the resolution inference rule.

Q2) Put in the CNF Form

a. $A \leftrightarrow (B \vee C)$

b. $\forall x \exists y\ course(x) \wedge std(y) \Rightarrow takes(y,x)$

Q3) Represent the following sentences in first-order logic

a. Only one student takes A.I.

b. No one takes A.I.

c. No two adjacent countries have the same map color

d. There is a makeup only for absent students.

e. There is a barber who shaves all men in town who do not shave themselves.

f. There are exactly two doctors in the cs department.

P.T.O.

Q(2) Here are two sentences in the language of first-order logic:

(A) $\forall x \; \exists y \; (x \geq y)$

(B) $\exists y \; \forall x \; (x \geq y)$

a. Assume that the variables range over all the natural numbers 0,1,2, . . . , m and that the "≥" predicate means "is greater than or equal to." Under this interpretation, translate (A) and (B) into English.
b. Is (A) true under this interpretation?
c. Is (B) true under this interpretation?
d. Does (A) logically entail (B)?
e. Does (B) logically entail (A)?
f. Using resolution, try to prove that (A) follows from (B). Do this even if you think that (B) does not logically entail (A); continue until the proof breaks down and you cannot proceed (if it does break down). Show the unifying substitution for each resolution step. If the proof fails, explain exactly where, how, and why it breaks down.

Best Wishes
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