Cairo University
Faculty of Computers and Artificial Intelligence
Department: Computer Science **Course Title: Artificial Intelligence**
Course Code: CS361 **Instructor: Prof. Abeer El Korany**

Question 1 State True/False [5 marks]

1. Logic knowledge representation requires facts and rules to represent and reason about the real world ( )
2. A Term is either an individual constant (a 0-ary function), or a variable, or an n-ary function applied to n terms: F(t1 t2 ..tn). ( )
3. Iterative Deepening Search is a way to make breadth search optimal for search problems with a constant step. ( )
4. The state space is the configuration of only possible states that represent the path from initial state to goal state ( )
5. Knowledge is aggregation of only data to make decision making process more easier ( )

Question 2* Complete the following statements *[5 marks]

1. The blind search strategy which is complete, i.e., always finds a solution if there is one is called ……
2. The knowledge representation (KR) requirements for any AI system should be …… , …… , ……
3. The process of deriving new knowledge from previous ones is called……
4. The following sentence "Ahmed has only two brothers" is represented as predicate logic as follows……..

Question 3[10]

A. Prove that $(P \vee Q) \wedge (R \vee P) \wedge (\neg Q \vee \neg R \vee P) \equiv P$ **(2 mark)**

B. Given the premises **(2 mark)**

1) $(\exists x)P(x)$
2) $(\forall x)[P(x) \rightarrow Q(x)]$ give a series of steps concluding that $(\exists x)Q(x)$.

C. **Consider the following FOL [6 marks]**

1. ∀ X vegetarian_meal (X) -> eat(ahmed,X) //Ahmed only eats vegetarian food
2. ∀ Y vegetarian_meal(Y) -> ~contain(Y,meat) //Vegetarian meals contain no meat
3. ∀ Z meal(Z) ^ at(Z, french-rest) -> vegtarian_meal(Z) //All meals at the French Restaurant are vegetarian
4. contain(escalop, meat) //Escalop contains meat
5. at(carte du jour, french-rest) //Catre du jour is a meal at the French Restaurant

i. Convert each predicate logic statement to CNF

ii. Use resolution to ask : *What meal would ahmed eat ?*