**الاسم : رضا أحمد قطب العماوى**

**Cs قسم 2:سكشن**

**Sheet 1**

**A)**

**1- Correct**

**2- Incorrect**

**3- Incorrect**

**4- Correct**

**B) Which of the following are correct translations of “No two adjacent countries have the same color”?**

**1- true**

**2- true**

**3- false**

**4- false**

**(d) Represent the following sentences in first-order logic, using a consistent vocabulary (which you must define):**

**a. ∃ x Student(x) ∧ Takes(x,F,Spring2001)**

**b. ∀ x,s Student(x) ∧ Takes(x,F,s) ⇒ Passes(x,F,s)**

**c. ∃ x Student(x)∧Takes(x,G,Spring2001)∧∀ y y 6= x ⇒ ¬Takes(y,G,Spring2001)**

**d. ∀ s ∃ x ∀ y Score(x,G,s) > Score(y,F,s)**

**e. ∀ x Person(x) ∧ (∃ y,z Policy(y) ∧ Buys(x,y,z)) ⇒ Smart(x)**

**f. ∀ x,y,z Person(x) ∧ Policy(y) ∧ Expensive(y) ⇒ ¬Buys(x,y,z)**

**g. ∃ x Agent(x) ∧ ∀ y,z Policy(y) ∧ Sells(x,y,z) ⇒ (Person(z) ∧ ¬Insured(z))**

**h. ∃ x Barber(x) ∧ ∀ y Man(y) ∧ ¬Shaves(y,y) ⇒ Shaves(x,y)**

**i. ∀ x Person(x)∧Born(x,UK)∧(∀ y Parent(y,x) ⇒ ((∃ r Citizen(y,UK,r))∨ Resident(y,UK))) ⇒ Citizen(x,UK,Birth).**

**E) ∀p ∃L . Language (L) and person (p) ∧ german (p) ⇒ speak(p,L)**

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**F)**

**TELL (KB, Child( William, Diana))**

**TELL (KB, Child(William, Charks))**

**TELL (KB, Child(Hany, Diana))**

**TELL (KB, Child(Harry, Charles))**

**TELL (KB, Child( William, Diana))**

**TELL (KB, Child( William, Charles))**

**TELL (KB, Child(Harry, Diana))**

**TELL (KB, Child(Ilarry,Charles))**

**TELL (KB, Child(Peter,Anne))**

**TELL (KB, Child(Peter,Mark))**

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**2. Write down logical representations for the following sentences, suitable for use with Generalized Modus Ponens:**

**a. Horses, cows, and pigs are mammals.**

**Horse(x) ⇒ Mammal(x), Cow(x) ⇒ Mammal(x), Pig(x) ⇒ Mammal(x)**

**b) An offspring of a horse is a horse.**

**Horse(x) ^ Offspring(x,y) ⇒ Horse(y)**

**c) Bluebeard is a horse.**

**Horse(x) ^ Name(x,Bluebeard) ⇒ Horse(Bluebeard)**

**d) Bluebeard is Charlie’s parent.**

**ParentOf(Bluebeard,Charlie)**

**e) Offspring and parent are inverse relations.**

**ParentOf(x,y) ⇔ Offspring(y,x)**

**f) Every mammal has a parent.**

**Mammal(x) ⇒HasParent(x)**