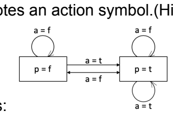
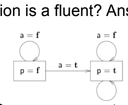
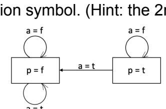
Consider the following TBox. $A \sqsubseteq \exists R.B$ $A \sqsubseteq \forall R.C$ Which option is the First-Order formula that is translated from this TBox? $\forall x(A(x) \rightarrow \exists y(R(x,y) \wedge B(y))) \wedge \forall x(A(x) \rightarrow \forall y(R(x,y) \rightarrow C(y)))$
Which option is entailed by the following TBox? $A \sqsubseteq \exists R.B$ $A \sqsubseteq \forall R.C$ Ans: $A \sqsubseteq \exists R.(B \sqcap C)$
Consider the following ALC role assertions.teaches(Joe, KR) teaches(Joe, AI) ≤0 teaches(Joe) Which option is correct? Ans: **It is an ABox and is not satisfiable.**
Which kind of reasoning in ontologies should you use in answering the previous question (question 3)? Ans: **Knowledge Base Satisfiability**
Which option is a suitable ALC concept in description logic for the class of humans “happy pet owner”, using the following concept names and role name? concept names: Person, Happy, Animal role name: own Ans: **Person ⊓ Happy ⊓ ∃owns.Animal** Which option about the use of ontologies in industrial applications is correct? Ans: **The relationship between entities is represented by typed edges in a knowledge graph.**
Which option about the use of ontologies in industrial applications is correct? Ans: **DBpedia automatically evolves as Wikipedia changes.**
Which option is correct about RDF? Ans: **We can use reification to turn a sequence of information into statements in RDF.**
Using the following concept names and role names, which option can correctly capture the knowledge “cars are exactly those vehicles that have wheels and are powered by an engine”? concept names: Vehicle, Car, Wheel, Engine role names: hasPart, poweredBy Ans: **Car ≡ Vehicle ⊓ ∃hasPart.Wheel ⊓ ∃poweredBy.Engine** Which option is correct about RDFS? Ans: **Instances of a class inherit the properties of that class.**
Using the following concept names and role names, which option can correctly capture the knowledge “bicycles have exactly two wheels”? concept names: Bicycle,Wheel role names: hasPart Ans: **Bicycle ⊑ (=2 hasPart.Wheel)**
Which of the following statements is correct? Ans: **A ⊓ ∃r.A ⊓ ∀r.B is subsumed by A ⊓ ∃r.B** Consider the following MLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), smoke(bob)} under MLN. (x, y range over both object constants.) $2:\ smoke(y) \leftarrow smoke(x) \wedge influence(x,y)$ $1:\ smoke(alice)$ $\alpha:\ influence(alice, bob)$ Ans: **exp(9)** Consider the following LPMLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), smoke(bob)} under LPMLN. (x, y range over both object constants.) $2:\ smoke(y) \leftarrow smoke(x) \wedge influence(x,y)$ $1:\ smoke(alice)$ $\alpha:\ influence(alice, bob)$ Ans: **0**
Consider the following LPMLN program. Apply the completion method to convert the LPMLN program into an equivalent Markov Logic Network. Which option is the correct MLN program? $\alpha : p$ $1 : p \leftarrow \neg q$ Ans: $\alpha : p$ $1 : p \leftarrow \neg q$ $\alpha : p \rightarrow \top \vee \neg q$ $\alpha : q \rightarrow \bot$
Which option is the most probable stable model of the following LPMLN program? $1 : p$ $\alpha : p \leftarrow q$ $\alpha : \bot \leftarrow \neg q$ Ans: **{p}** Which option is the weight of the most probable stable model of the following LPMLN program? $1 : q$ $-2 : p \leftarrow q$ $-3 : \bot \leftarrow r$ Ans: **exp(-2)**
Consider the following LPMLN program. Translate it into an ASP program containing weak constraints. Which option is the correct translated ASP program? $1 : p$ $-2 : p \leftarrow q$ $3 : \bot \leftarrow p$ Ans: **unsat(1) :- not p. p :- not unsat(1). :~ unsat(1). [1] unsat(2) :- q, not p. p :- q, not unsat(2). :~ unsat(2). [-2] unsat(3) :- p. :- p, not unsat(3). :~ unsat(3). [3]**
Consider the following LPMLN program. Which option is the most probable stable model of the program? $1 : p$ $-2 : p \leftarrow q$ $3 : \bot \leftarrow p$ **Ans:** ∅ Which option about probability is impossible no matter what random variables A and B are? Ans: **P(A | B) < P(A, B)** Consider the following full joint distribution for Boolean variables A, B, and C. Which option is closest to the value of P(A = 1 | B=1, C = 0)? Ans: **0.25** Consider the same full joint distribution for Boolean variables A, B, and C as in question 9. Are A and B independent of each other? Ans: **True** Consider the transition system in the following image, which option contains all the fluent(s)? Ans: **p** Which options are the stable models that correspond to the following transition system? Choose all that apply. Ans: **{p(f,0), p(t,1), a(0)} , {p(f,0), p(f,1)} , {p(t,0), p(t,1), a(0)}** Consider the same transition system in question 2, which option, along with the following constraint, represents the commonsense law of inertia? :- T=1..m, not 1{p(t, T); p(f, T)}1. Ans: **{p(t,1)} :- p(t,0).**
Choose the transition system described by the following ASP program. Note that: p denotes a fluent symbol, and a denotes an action symbol.(Hint: the 4th rule is different from that in the slides.) boolean(t;f). p(t,T+1) :- a(T), T=0..m-1. 1{p(B,0):boolean(B)}1. 1{p(B,T):boolean(B)}1 :- T=1..m. {a(T)} :- T=0..m-1. {p(B,T+1)} :- p(B,T), T=0..m-1. Ans:



Consider the following clingo program for “Monkey and Bananas” problem. Which option is a set of rules that makes the following rule redundant? :- climbOn(T), climbOff(T). Ans: **onBox(t,T+1) :- climbOn(T). onBox(f,T+1) :- climbOff(T). :- not 1{onBox(BB,T)}1, T = 1..m.**
Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, can G1 move B onto C at the same time G2 moves C onto the table? Ans: **No**
Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, can G1 move B onto D at the same time G2 moves C onto the table? Ans: **Yes**
Consider the following clingo program for “Blocks World” problem. Suppose there are 2 boxes A and B where A is on the table and B is on A. If you want to use clingo to generate a plan to move A onto B, which option is the set of rules you need to add? Ans: **:- not on(a, table, 0). :- not on(b, a, 0). :- not on(a, b, m). :- not on(b, table, m).** Consider the following clingo program discussed in the module “Expressive Possibilities”. Which option correctly explains why the effect of action “go” is nondeterministic? Ans: **The rule below uses a choice rule in the head to represent that the location of the car may or may not change to the location that jack goes to. {loc(car,L,T+1)} :- go(L,T), loc(car,L1,T), loc(jack,L1,T), T=0..m-1.**
Consider the following clingo program for “pendulum” problem. Suppose we observe that the pendulum is on the right at time 0. We also observe that it is also on the right at time 2. When m equals to 2, how many stable models of the above program will agree with these observations? Ans: **2** Consider the scenario where two agents lift the opposite ends of a table upon which various objects have been placed. If one end of the table has been raised, the objects on the table will fall off. But if both ends are lifted simultaneously, the objects on the table will remain fixed. The clingo program for this scenario is as follows: Which of the following options represents the statement “actions are exogeneous”? Ans: **{lift(E,T)} :- end(E), T=0..m-1.** Consider the Monkey and Bananas problem represented by the following clingo program. Which of the following rules represent the post-diction query: “The monkey walked to location L3 and then pushed the box. Does it follow that the box was initially at L3?” Ans: :- **not walk(l3,0). :- not 1{pushBox(LL,1):location(LL)}. :- loc(box,l3,0).**
Consider a simple transition system represented by the following clingo program. How many stable models does this program have? Ans: **6**
In the semantics of LPMLN, the following formulae represent _________-based weight. $W(I) = e- \sum w{:}R{\in}\Pi,I{\not\models}R\ w\ \Pi\ P$=lim(Π) Ans: **Penalty**
Consider the following full joint distribution for Boolean variables A, B, and C. Ans: **0.75** Consider the following LPMLN program Π. What is $W(\{M(birb)\})$? Ans: e**3**α
Which of the following are true about very large ontologies? Ans: **DBPedia is written in RDF. WordNet is a large lexical database of English words. YAGO2 incorporates temporal and spatial data.**
What are the basic ideas of RDF? Ans: **Resources, Properties, Statements** Which of the following are examples of Concept Inclusions? Ans: **Disjointness of Concepts, Coverings, Domain Restrictions, Range Restrictions** Using the following concept and role names, which option correctly captures the knowledge “Latte is exactly that Coffee Drink which has Espresso and Steamed Milk as its ingredients”. Concept Names: Latte, CoffeeDrink, Espresso, SteamedMilk Role Names: hasIngredient Ans: **"Latte≡CoffeeDrink ⊓∃hasIngredient.Espresso ⊓∃hasIngredient.SteamedMilk"**
Transition Systems: Directed graphs whose vertices correspond to the actions and edges are labeled by states. Is the definition of Transition Systems true or false? Ans: **False**
Which are the stable models for the given transition system? Ans: **{ p(t, 0), p(t, 1), a(0)} { p(f, 0), p(f, 1)}**
Choose all the fluents from the given options. Ans: **Monkey has the banana, The location of the box, Monkey is on the box**
For the state, given above, choose the correct common-sense law of intertia. Ans: **{p(t,1)}:-p(t,0). { p(f, 1) } :- p(f, 0). :- not 1 { p(t, 1); p(f, 1) } 1.**
Which option is the most probable stable model of the following LPMLN Program? 1: p α : p <- q α : <- ~q Ans: **a. Ø b. {p}**
If A and B are random variables, which option about probability is impossible? Ans: **P(A | B) = P(A, B) ; P(B | A) > P(A | B) ; P(B) > P(A, B)**
Consider the given full-joint distribution for Boolean variables A, B, and C. What is the value of P(A = 1 | B = 1, C = 0)? Ans: **0.25**
Which option about the use of ontologies in industrial applications is correct? Ans: **DBpedia automatically evolves as Wikipedia changes.**
Which is correct regarding the Resource Description Framework? Ans: **We can reification to turn a sequence of information into statements in RDF.**
Which option is correct? Ans: **AΠ∃r.AΠ Π∃r.B**
Considering “monkey grasp bananas” problem in the following image, which option is a fluent? Ans: **The location of the box.**



Consider the following image, which option represents “actions are exogenous”? Ans: **{a(0)}.** Choose the transition system described by the following ASP program. Note that p denotes a fluent symbol, and a denotes an action symbol. (Hint: the 2nd rule is different from that in the slides.) boolean(t;f). p(f, T+1) :- a(T), T=0..m-1. 1{p(B,0): boolean(B)}1. :- T=1..m, not 1{p(B, T): boolean(B)}1. {a(T)} :- T=0..m-1. {p(B, T+1)} :- p(B, T), T=0..m-1. Ans:



Consider the same clingo program below that you have seen in question 3. How many stable models are there when m equals to 1? boolean(t;f). p(f, T+1) :- a(T), T=0..m-1. 1{p(B,0): boolean(B)}1. :- T=1..m, not 1{p(B, T): boolean(B)}1. {a(T)} :- T=0..m-1. {p(B, T+1)} :- p(B, T), T=0..m-1. Ans: **4** Consider the following clingo program for “Monkey and Bananas” problem. Ans: **loc(monkey,L,T+1) :- walk(L,T). loc(monkey,L,T+1) :- pushBox(L,T). :- not 1{loc(O,LL,T)}1, object(O), T = 1..m.** Consider the clingo program for “Monkey and Bananas” problem in question 5. Suppose monkey and bananas are in location L1, and the box is in location L2. If you want to use clingo to generate a plan for the monkey to get the bananas, which option is the set of rules you need to add? Ans: **:- not loc(monkey, l1, 0; bananas, l1, 0; box, l2, 0).:- not hasBananas(f, 0; t, m).** Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, when A, B are on the table and C is on B, can G1 move C onto the table at the same time G2 moves A onto B? Ans: **Yes** Consider the following clingo program discussed in the module "Expressive Possibilities".Suppose Jack and his car are at home at time 0 and he goes to work at time 0. How many stable models are there that following this condition when m equals to 1? Ans: **2** Consider the following clingo program for “lifting” problem.When m equals to 1, how many stable models of this program satisfy the following scenario?% scenario onTable(t,0). level(E,low,0) :- end(E). :- not onTable(t,m). :- level(E,low,m). Ans: **1** Which option is correct about action description languages? Ans: **They are used to describe the preconditions and effects of actions.** Consider the following MLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), influence(alice, bob), smoke(bob)} under MLN. (x, y range over both object constants.) 2: smoke(y) ⟵ smoke(x) ∧ influence(x,y) 1: smoke(alice) **α**: influence(alice, bob) Ans:**exp(α+9)** Consider the following LPMLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), influence(alice, bob), smoke(bob)} under LPMLN. (x, y range over both object constants.) 2: smoke(y) ⟵ smoke(x) ∧ influence(x,y) 1: smoke(alice) **α**: influence(alice, bob) Ans: **exp(α+9)** Consider the following LPMLN program. Apply the completion method to convert the LPMLN program into an equivalent Markov Logic Network.
Which option is the correct MLN program? 1: p ¬q 2: q ¬p 4: q ¬r Ans: **1: p ¬q 2: q ¬p 4: q ¬r α: p → ¬q α: q → ¬p ∨ ¬r α: r → ⊥**
Which option is the most probable stable model of the following LPMLN program? 1: p ¬q **α**: q ¬p -4: p ¬r Ans: **{q}**
Which option is the weight of the most probable stable model of the following LPMLN program? 2: p q -2: q ¬r -5: ⊥ p Ans: **exp(0)**
Consider the following LPMLN program. Translate it into an ASP program containing weak constraints. Which option is the correct translated ASP program? 10: q p 1: r p 5: p -20: ⊥ ¬r Ans:
unsat(1) :- p, not q. q :- p, not unsat(1). :~ unsat(1). [10] unsat(2) :- p, not r. r :- p, not unsat(2). :~ unsat(2). [1] unsat(3) :- not p. p :- not unsat(3). :~ unsat(3). [5] unsat(4) :- not r. :- not r, not unsat(4). :~ unsat(4). [-20]
Consider the following LPMLN program. Which option is the most probable stable model of the program? 10: q p 1: r p 5: p -20: ⊥ ¬r Ans: **{p, q}**
Which option about probability is impossible no matter what random variables A and B are? Ans: **P(A, B) > P(A)**
Consider the same full joint distribution for Boolean variables A, B, and C as in question 9. Are A and B independent of each other? Ans: **True**

Which option entails the following TBox? $\forall R.A \sqsubseteq \exists R.B$ Ans: $\exists R.B$
Consider the following ALC concepts. hasChild(Joe, Ahn) hasChild(Joe, Eva) hasChild(Joe, Mary) ≤2 hasChild(Joe) Which option is correct? Ans: **It is an ABox and is satisfiable.**
Which kind of reasoning in ontologies should you use if you are asked “whether Barack’s last name is Obama” with some knowledge about Barack? Ans: **Instance checking**
Which option is a suitable ALC concept in description logic for the class of humans “pet owner who only owns cat”, using the following concept names and role name? concept names: Person, Cat, Animal role name: owns Ans: **Person ⊓ ∃owns.Animal ⊓ ∀owns .Cat**

Consider the following TBox. $A \sqsubseteq \exists R.B$ $A \sqsubseteq \forall R.C$ Which option is the First-Order formula that is translated from this TBox? $\forall x(A(x) \rightarrow \exists y(R(x,y) \wedge B(y))) \wedge \forall x(A(x) \rightarrow \forall y(R(x,y) \rightarrow C(y)))$

Which option is entailed by the following TBox? $A \sqsubseteq \exists R.B$ $A \sqsubseteq \forall R.C$ Ans: $A \sqsubseteq \exists R.(B \sqcap C)$
Consider the following ALC role assertions.teaches(Joe, KR) teaches(Joe, AI) ≤0 teaches(Joe) Which option is correct? Ans: **It is an ABox and is not satisfiable.**
Which kind of reasoning in ontologies should you use in answering the previous question (question 3)? Ans: **Knowledge Base Satisfiability**
Which option is a suitable ALC concept in description logic for the class of humans “happy pet owner”, using the following concept names and role name? concept names: Person, Happy, Animal role name: own Ans: **Person ⊓ Happy ⊓ ∃ owns.Animal** Which option about the use of ontologies in industrial applications is correct? Ans: **The relationship between entities is represented by typed edges in a knowledge graph.**
Which option about the use of ontologies in industrial applications is correct? Ans: **DBpedia automatically evolves as Wikipedia changes.**
Which option is correct about RDF? Ans: **We can use reification to turn a sequence of information into statements in RDF.**
Using the following concept names and role names, which option can correctly capture the knowledge “cars are exactly those vehicles that have wheels and are powered by an engine”? concept names: Vehicle, Car, Wheel, Engine role names: hasPart, poweredBy Ans: **Car ≡ Vehicle ⊓ ∃ hasPart.Wheel ⊓ ∃ poweredBy.Engine** Which option is correct about RDFS? Ans: **Instances of a class inherit the properties of that class.**
Using the following concept names and role names, which option can correctly capture the knowledge “bicycles have exactly two wheels”? concept names: Bicycle,Wheel role names: hasPart Ans: **Bicycle ⊑ (=2 hasPart.Wheel)**
Which of the following statements is correct? Ans: **A ⊓ ∃ r.A ⊓ ∀ r.B is subsumed by A ⊓ ∃ r.B** Consider the following MLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), smoke(bob)} under MLN. (x, y range over both object constants.)

$$\begin{array}{l} 2: \ smoke(y) \leftarrow smoke(x) \wedge influence(x,y) \\ 1: \ smoke(alice) \\ \alpha: \ influence(alice, bob) \end{array}$$

Ans: **exp(9)** Consider the following LPMLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), smoke(bob)} under LPMLN. (x, y range over both object constants.)

$$\begin{array}{l} 2: \ smoke(y) \leftarrow smoke(x) \wedge influence(x,y) \\ 1: \ smoke(alice) \\ \alpha: \ influence(alice, bob) \end{array}$$

Ans: **0**

Consider the following LPMLN program. Apply the completion method to convert the LPMLN program into an equivalent Markov Logic Network. Which option is the correct MLN program?

$$\begin{array}{l} \alpha : p \\ 1 : p \leftarrow \neg q \end{array}$$

Ans:

$$\begin{array}{l} \alpha : p \\ 1 : p \leftarrow \neg q \\ \alpha : p \rightarrow \top \vee \neg q \\ \alpha : q \rightarrow \bot \end{array}$$

Which option is the most probable stable model of the following LPMLN program?

$$\begin{array}{l} 1 : p \\ \alpha : p \leftarrow q \\ \alpha : \bot \leftarrow \neg q \end{array}$$

Ans: **{p}** Which option is the weight of the most probable stable model of the following LPMLN program?

$$\begin{array}{l} 1 : q \\ -2 : p \leftarrow q \\ -3 : \bot \leftarrow r \end{array}$$

Ans: **exp(-2)**

Consider the following LPMLN program. Translate it into an ASP program containing weak constraints. Which option is the correct translated ASP program?

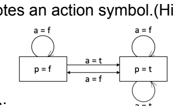
$$\begin{array}{l} 1 : p \\ -2 : p \leftarrow q \\ 3 : \bot \leftarrow p \end{array}$$

Ans: **unsat(1) :- not p. p :- not unsat(1). :~ unsat(1). [1] unsat(2) :- q, not p. p :- q, not unsat(2). :~ unsat(2). [-2] unsat(3) :- p. :- p, not unsat(3). :~ unsat(3). [3]**

Consider the following LPMLN program. Which option is the most probable stable model of the program?

$$\begin{array}{l} 1 : p \\ -2 : p \leftarrow q \\ 3 : \bot \leftarrow p \end{array}$$

Ans: ∅ Which option about probability is impossible no matter what random variables A and B are? Ans: **P(A | B) < P(A, B)** Consider the following full joint distribution for Boolean variables A, B, and C. Which option is closest to the value of P(A = 1 | B=1, C = 0)? Ans: **0.25** Consider the same full joint distribution for Boolean variables A, B, and C as in question 9. Are A and B independent of each other? Ans: **True** Consider the transition system in the following image, which option contains all the fluent(s)? Ans: **p** Which options are the stable models that correspond to the following transition system? Choose all that apply. Ans: **{p(f,0), p(t,1), a(0)} , {p(f,0), p(f,1)} , {p(t,0), p(t,1), a(0)}** Consider the same transition system in question 2, which option, along with the following constraint, represents the commonsense law of inertia? :- T=1..m, not 1{p(t, T); p(f, T)}1. Ans: **{p(t,1)} :- p(t,0).**
Choose the transition system described by the following ASP program. Note that: p denotes a fluent symbol, and a denotes an action symbol.(Hint: the 4th rule is different from that in the slides.) boolean(t;f). p(t,T+1) :- a(T), T=0..m-1. 1{p(B,0):boolean(B)}1. 1{p(B,T):boolean(B)}1 :- T=1..m. {a(T)} :- T=0..m-1. {p(B,T+1)} :- p(B,T), T=0..m-1. Ans:



Consider the following clingo program for “Monkey and Bananas” problem. Which option is a set of rules that makes the following rule redundant? :- climbOn(T), climbOff(T). Ans: **onBox(t,T+1) :- climbOn(T). onBox(f,T+1) :- climbOff(T). :- not 1{onBox(BB,T)}1, T = 1..m.**
Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, can G1 move B onto C at the same time G2 moves C onto the table? Ans: **No**
Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, can G1 move B onto D at the same time G2 moves C onto the table? Ans: **Yes**
Consider the following clingo program for “Blocks World” problem. Suppose there are 2 boxes A and B where A is on the table and B is on A. If you want to use clingo to generate a plan to move A onto B, which option is the set of rules you need to add? Ans: **:- not on(a, table, 0). :- not on(b, a, 0). :- not on(a, b, m). :- not on(b, table, m).** Consider the following clingo program discussed in the module “Expressive Possibilities”. Which option correctly explains why the effect of action “go” is nondeterministic? Ans: **The rule below uses a choice rule in the head to represent that the location of the car may or may not change to the location that jack goes to. {loc(car,L,T+1)} :- go(L,T), loc(car,L1,T), loc(jack,L1,T), T=0..m-1.**
Consider the following clingo program for “pendulum” problem. Suppose we observe that the pendulum is on the right at time 0. We also observe that it is also on the right at time 2. When m equals to 2, how many stable models of the above program will agree with these observations? Ans: **2** Consider the scenario where two agents lift the opposite ends of a table upon which various objects have been placed. If one end of the table has been raised, the objects on the table will fall off. But if both ends are lifted simultaneously, the objects on the table will remain fixed. The clingo program for this scenario is as follows: Which of the following options represents the statement “actions are exogeneous”? Ans: **{lift(E,T)} :- end(E), T=0..m-1.** Consider the Monkey and Bananas problem represented by the following clingo program. Which of the following rules represent the post-diction query: “The monkey walked to location L3 and then pushed the box. Does it follow that the box was initially at L3?” Ans: :- **not walk(l3,0). :- not 1{pushBox(LL,1):location(LL)}. :- loc(box,l3,0).**
Consider a simple transition system represented by the following clingo program. How many stable models does this program have? Ans: **6**
In the semantics of LPMLN, the following formulae represent _________-based weight. $W(I) = e - \sum w{:}R{\in}\Pi{,}I{\nvDash}R \ w \ \Pi \ P$=lim(Π) Ans: **Penalty**
Consider the following full joint distribution for Boolean variables A, B, and C. Ans: **0.75** Consider the following LPMLN program Π. What is $W(\{M(birb)\})$? Ans: e**3**α
Which of the following are true about very large ontologies? Ans: **DBPedia is written in RDF. WordNet is a large lexical database of English words. YAGO2 incorporates temporal and spatial data.**
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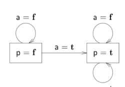
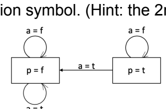
Transition Systems: Directed graphs whose vertices correspond to the actions and edges are labeled by states. Is the definition of Transition Systems true or false? Ans: **False**
Which are the stable models for the given transition system? Ans: **{ p(t, 0), p(t, 1), a(0)} { p(f, 0), p(f, 1)}**
Choose all the fluents from the given options. Ans: **Monkey has the banana, The location of the box, Monkey is on the box**
For the state, given above, choose the correct common-sense law of intertia. Ans: **{p(t,1)}:-p(t,0). { p(f, 1) } :- p(f, 0). :- not 1 { p(t, 1); p(f, 1) } 1.**
Which option is the most probable stable model of the following LPMLN Program? 1: p α : p <- q α : <- ~q Ans: **a. Ø b. {p}**
If A and B are random variables, which option about probability is impossible? Ans: **P(A | B) = P(A, B) ; P(B | A) > P(A | B) ; P(B) > P(A, B)**
Consider the given full-joint distribution for Boolean variables A, B, and C. What is the value of P(A = 1 | B = 1, C = 0)? Ans: **0.25**
Which option about the use of ontologies in industrial applications is correct? Ans: **DBpedia automatically evolves as Wikipedia changes.**
Which is correct regarding the Resource Description Framework? Ans: **We can reification to turn a sequence of information into statements in RDF.**
Which option is correct? Ans: **A⊓∃r.A⊓ ⊓∃r.B**
Considering “monkey grasp bananas” problem in the following image, which option is a fluent? Ans: **The location of the box.**



Consider the following image, which option represents “actions are exogenous”? Ans: **{a(0)}.** Choose the transition system described by the following ASP program. Note that p denotes a fluent symbol, and a denotes an action symbol. (Hint: the 2nd rule is different from that in the slides.) boolean(t;f). p(f, T+1) :- a(T), T=0..m-1. 1{p(B,0): boolean(B)}1. :- T=1..m, not 1{p(B, T): boolean(B)}1. {a(T)} :- T=0..m-1. {p(B, T+1)} :- p(B, T), T=0..m-1. Ans:



Consider the same clingo program below that you have seen in question 3. How many stable models are there when m equals to 1? boolean(t;f). p(f, T+1) :- a(T), T=0..m-1. 1{p(B,0): boolean(B)}1. :- T=1..m, not 1{p(B, T): boolean(B)}1. {a(T)} :- T=0..m-1. {p(B, T+1)} :- p(B, T), T=0..m-1. Ans: **4** Consider the following clingo program for “Monkey and Bananas” problem. Ans: **loc(monkey,L,T+1) :- walk(L,T). loc(monkey,L,T+1) :- pushBox(L,T). :- not 1{loc(O,LL,T)}1, object(O), T = 1..m.** Consider the clingo program for “Monkey and Bananas” problem in question 5. Suppose monkey and bananas are in location L1, and the box is in location L2. If you want to use clingo to generate a plan for the monkey to get the bananas, which option is the set of rules you need to add? Ans: **:- not loc(monkey, l1, 0; bananas, l1, 0; box, l2, 0).:- not hasBananas(f, 0; t, m).** Consider the following clingo program for “Blocks World” problem. Suppose we have two grippers G1 and G2. According to the ASP formalization, when A, B are on the table and C is on B, can G1 move C onto the table at the same time G2 moves A onto B? Ans: **Yes** Consider the following clingo program discussed in the module "Expressive Possibilities".Suppose Jack and his car are at home at time 0 and he goes to work at time 0. How many stable models are there that following this condition when m equals to 1? Ans: **2** Consider the following clingo program for “lifting” problem.When m equals to 1, how many stable models of this program satisfy the following scenario?% scenario onTable(t,0). level(E,low,0) :- end(E). :- not onTable(t,m). :- level(E,low,m). Ans: **1** Which option is correct about action description languages? Ans: **They are used to describe the preconditions and effects of actions.** Consider the following MLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), influence(alice, bob), smoke(bob)} under MLN. (x, y range over both object constants.) 2: smoke(y) ⟵ smoke(x) ∧ influence(x,y) 1: smoke(alice) α: influence(alice, bob) Ans: **exp(α+9)** Consider the following LPMLN program with two object constants alice and bob. Compute the unnormalized probability measure (i.e., weight) of the interpretation I = {smoke(alice), influence(alice, bob), smoke(bob)} under LPMLN. (x, y range over both object constants.) 2: smoke(y) ⟵ smoke(x) ∧ influence(x,y) 1: smoke(alice) α: influence(alice, bob) Ans: **exp(α+9)** Consider the following LPMLN program. Apply the completion method to convert the LPMLN program into an equivalent Markov Logic Network.
Which option is the correct MLN program? 1: p ¬q 2: q ¬p 4: q ¬r Ans: **1: p ¬q 2: q ¬p 4: q ¬r α: p → ¬q α: q → ¬p ∨ ¬r α: r → ⊥**
Which option is the most probable stable model of the following LPMLN program? 1: p ¬q α: q ¬p -4: p ¬r Ans: **{q}**
Which option is the weight of the most probable stable model of the following LPMLN program? 2: p q -2: q ¬r -5: ⊥ p Ans: **exp(0)**
Consider the following LPMLN program. Translate it into an ASP program containing weak constraints. Which option is the correct translated ASP program? 10: q p 1: r p 5: p -20: ⊥ ¬r Ans:
unsat(1) :- p, not q. q :- p, not unsat(1). :~ unsat(1). [10] unsat(2) :- p, not r. r :- p, not unsat(2). :~ unsat(2). [1] unsat(3) :- not p. p :- not unsat(3). :~ unsat(3). [5] unsat(4) :- not r. :- not r, not unsat(4). :~ unsat(4). [-20]
Consider the following LPMLN program. Which option is the most probable stable model of the program? 10: q p 1: r p 5: p -20: ⊥ ¬r Ans: **{p, q}**
Which option about probability is impossible no matter what random variables A and B are? Ans: **P(A, B) > P(A)**
Consider the same full joint distribution for Boolean variables A, B, and C as in question 9. Are A and B independent of each other? Ans: **True**

Which option entails the following TBox? $\forall R.A \sqsubseteq \exists R.B$ Ans: $\exists R.B$
Consider the following ALC concepts. hasChild(Joe, Ahn) hasChild(Joe, Eva) hasChild(Joe, Mary) ≤2 hasChild(Joe) Which option is correct? Ans: **It is an ABox and is satisfiable.**
Which kind of reasoning in ontologies should you use if you are asked “whether Barack’s last name is Obama” with some knowledge about Barack? Ans: **Instance checking**
Which option is a suitable ALC concept in description logic for the class of humans “pet owner who only owns cat”, using the following concept names and role name? concept names: Person, Cat, Animal
role name: owns Ans: **Person ⊓ ∃ owns.Animal ⊓ ∀ owns .Cat**