Stude	ent ID:	I	Ouration: 15 mins	Date: 13/04/2023	
Stude	ent name:			Score: <u>/ 3</u>	
		Find the MGU for each of the following pairs		sts such an MGU, write	
a.			re A is a constant sym		
b.			where A is a constant symbol		
Ques	tion 2 (2pts	s) Translate the following sentences from Eng	lish to First-order log	ic.	
No.	Score (pt)	Sentence			
1	0.25	Fish oil is a non-saturated fat, and thus it is	healthy.		
2	0.25	Every dish contains some fats.			
3	0.25	Some dishes do not contain any kind of saturated fat.			
4	0.25	Not every fat is contained in all dishes.			
5	0.5	Only one unhealthy fat is non-saturated.			
6	0.5	All kind of fats are saturated or healthy (bu	t not both at the same	time).	
using	only the giv	ren predicates			
•	Dish(x): x	-	ıt • Conta	ins(x, y): x contains y	
•		a constant • Saturated(x): x is satu		ny(x): x is healthy	
1.					
2.					
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Stude	ent ID:	Duration: 15 mins Date: 13/04/202	Date: 13/04/2023	
Stude	ent name:	Score:/	3	
the su	ıbstitution θ	Find the MGU for each of the following pairs of clauses. If there exists such an MGU, write . Otherwise, write No MGU and justify your answer. B)) and Q($G(x, x)$, y) where A and B are constant symbols	te	
b.	Q(F(A), A,	z) and Q($F(x)$, y , $G(B)$) where A and B are constant symbols		
Ques	tion 2 (2pts	Translate the following sentences from English to First-order logic.		
No.	Score (pt)	Sentence		
1	0.25	Beefsteak is a delicious dish, yet it is unhealthy.		
2	0.25	Every dish contains some sauce.		
3	0.25	Some sauces are not contained in all awful dishes.		
4	0.25	Not every dish contains all sauces.		
5	0.5	Beefsteak dish contains exactly one kind of sauce.		
6	0.5	Each dish is delicious or healthy (but not both simultaneously).		
using • •	Dish(x): x	 en predicates is a dish Sauce(x): x is a kind of sauce Delicious(x): x is delicious (whose opposite is awful) Contains(x, y): x contains Healthy(x): x is healthy 	у	
1.				
3.				
4.				
5.				
6.				

Question 1 (1pt) Find the MGU for each of the following pairs of clauses. If there exists such an MGU, wr the substitution 0. Otherwise, write No MGU and justify your answer. a. R(x, A, G(z), F(z)) and R(H(A, y), A, G(B), y) where A and B are constant symbols b. R(F(x), A) and R(y, F(w)) where A is a constant symbol Question 2 (2pts) Translate the following sentences from English to First-order logic. No. Score (pt) Sentence 1 0.25 Any berry is sour or inedible. 2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
the substitution θ . Otherwise, write No MGU and justify your answer. a. $R(x, A, G(z), F(z))$ and $R(H(A, y), A, G(B), y)$ where A and B are constant symbols b. $R(F(x), A)$ and $R(y, F(w))$ where A is a constant symbol Question 2 (2pts) Translate the following sentences from English to First-order logic. No. Score (pt) Sentence 1 0.25 Any berry is sour or inedible. 2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
b. R(F(x), A) and R(y, F(w)) where A is a constant symbol Question 2 (2pts) Translate the following sentences from English to First-order logic. No. Score (pt) Sentence 1 0.25 Any berry is sour or inedible. 2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
Question 2 (2pts) Translate the following sentences from English to First-order logic. No. Score (pt) Sentence 1 0.25 Any berry is sour or inedible. 2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
No.Score (pt)Sentence10.25Any berry is sour or inedible.20.25Every pie includes some berries.30.25Some pie includes no sweet berry.40.25There is no berry that all pies do not include.50.5There are at least two sweet berries60.5Each berry is either edible or sweet (but both at different times).using only the given predicates•Berry(x): x is a berry•Sour(x): x is sour•Pie(x): x is a pie
1 0.25 Any berry is sour or inedible. 2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
2 0.25 Every pie includes some berries. 3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
3 0.25 Some pie includes no sweet berry. 4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
4 0.25 There is no berry that all pies do not include. 5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
5 0.5 There are at least two sweet berries 6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
6 0.5 Each berry is either edible or sweet (but both at different times). using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
using only the given predicates • Berry(x): x is a berry • Sour(x): x is sour • Pie(x): x is a pie
 Berry(x): x is a berry Sour(x): x is sour Pie(x): x is a pie
 Edible(x): x is edible (whose opposite is sweet) Includes(x, y): x includes y
1.
2
3.
4
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ɔ
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Student ID:Student name:			Duration: 15 mins		Date: 13/04/2023	
					Score:/ <u>3</u>	
the su	ibstitution θ	Find the MGU for each of t	GU and justify your		here exists	such an MGU, write
a.	S(x, G(x), x)	() and S(G(u), G(G(z)),	z)			
b.	S (A, x, G(y	y, y)) S (y, B, z)		where A and	B are cons	tant symbols
) Translate the followin	g sentences from En	glish to First-c	order logic	
No.	Score (pt)	Sentence	1	1		
1	0.25	Strawberry is sour, an		e berry.		
2	0.25	Every berry grows in s				
3	0.25	There are some garde		ry grows.		
4	0.25	Not all berries grow in				
5	0.5	There is exactly one in				
6	0.5	Each garden has some	thing that is a berry	or inedible (bu	it both at o	different times).
using	only the give	en predicates				
•	Berry(x): x	is a berry •	Edible(x): x is edibl	e •	Garden(x	:): x is a garden
•		y is a constant •	Sour(x): x is sour (whose opposite is	•	-	y): x grows in y
1.						
2.						
3.						
4.						
5.				•••••		
_						
6.						

SOLUTION

		,		
Stude	nt ID:		Duration: 15 mins	Date: 13/04/2023
Stude	ent name:			Score: <u>/ 3</u>
0	tion 1 (1mt)	Find the MCII for each of the following	a naiva of alougoa If those onia	ta ayah ay MCU yarita
-	` - /	Find the MGU for each of the following Otherwise, write No MGU and justify		as such an MGU, write
		•	where A is a constant sym	ıbol
		y), x/A, y/A }	·	
А		x)) and P(y, y)	where A is a constant sym	
u.			•	
	<u>INO IVIGO. y</u>	cannot unify with two functions of diffe	erent concepts.	
_		Translate the following sentences fr	om English to First-order log	ic.
No.	Score (pt)	Sentence	1 1.1	
1	0.25	Fish oil is a non-saturated fat, and the	ius it is nealthy.	
2	0.25	Every dish contains some fats.	l of oatsurated fat	
3	0.25	Some dishes do not contain any kind of saturated fat.		
4	0.25	Not every fat is contained in all dishe		
5	0.5	Only one unhealthy fat is non-satura		1'
6	0.5	All kind of fats are saturated or heal	thy (but not both at the same	time).
Using	only the giv	en predicates		
•	Dish(x): x i	s a dish • Fat(x): x is a ki	ind of fat • Conta	ins(x, y): x contains y
•	Fish oil is a	• Saturated(x): x	k is saturated • Health	ny(x): x is healthy
1.	Fat(Fish oil)		oil)	
2.	∀x Dish(x) -	→ [∃v Fat(v) ∧ Contains(x, v)]		
	. $\forall x \text{Dish}(x) \rightarrow [\exists y \text{Fat}(y) \land \text{Contains}(x, y)]$			
3.	. $\exists x \ Dish(x) \land [\forall y \ Fat(y) \land Saturated(y) \rightarrow \neg Contains(x, y)]$			
4.	$-\forall x \ Fat(x) \to [\ \forall y \ Dish(y) \to Contains(y, x)\]$			
5.	∃x Fat(x) ∧	—Healthy(x) ∧ —Saturated(x) ∧ [∀y Fa	$t(y) \land \neg Healthy(y) \land \neg (x = y) - \neg (x = y)$	→ Saturated(γ)]
6	∀x Fat(v) _	Saturated(x) ↔ ¬Healthy(x)		
υ.	· v v i artv) —	- Satarates(A) \ /		

Stude	nt ID:		Duration: 15 mins	Date: 13/04/2023	
Stude	tudent name: Score:				
	••••				
the su a.	lbstitution θ. Q(y, G(A, E No MGU. x Q(F(A), A,	cannot unify with both constants A and	your answer. where A and B are constant s B where A and B are constant s	ymbols ymbols	
Ques	tion 2 (2pts) Translate the following sentences fr	om English to First-order logi	c.	
No.	Score (pt)	Sentence			
1	0.25	Beefsteak is a delicious dish, yet it is	unhealthy.		
2	0.25	Every dish contains some sauce.			
3	0.25	Some sauces are not contained in all	l awful dishes.		
4	0.25	Not every dish contains all sauces.			
5	0.5	Beefsteak dish contains exactly one	kind of sauce.		
6	0.5 Each dish is delicious or healthy (but not both simultaneously).				
1. 2.	 Dish(x): x is a dish Beefsteak is a constant Delicious(x): x is a kind of sauce Beefsteak is a constant Delicious(x): x is delicious (whose opposite is awful) Dish(Beefsteak) ∧ Delicious(Beefsteak) ∧ ¬Healthy(Beefsteak) ∀x Dish(x) → [∃y Sauce(y) ∧ Contains(x, y)] ∃x Sauce(x) ∧ [∀y Dish(y) ∧ ¬Delicious(y) → ¬Contains(y, x)] ¬∀x Dish(x) → [∀y Sauce(y) → Contains(x, y)] 				
5.	Dish(Beefst	eak) ∧ ∃x Sauce(x) ∧ Contain(Beefstea	<u>k, x) ∧</u>		
	[∀y Sauce($y) \land \neg (x = y) \rightarrow \neg Contain(Beefsteak, y)$	<u>)] </u>		
6.	∀x Dish(x)	\rightarrow Delicious(x) \leftrightarrow \neg Healthy(x)			
	- L.A				

Student ID:			Duration: 15 mins	Date: 13/04/2023		
Student name:				Score: <u>/ 3</u>		
		Find the MGU for each of the followi		sts such an MGU, write		
a.	R(x, A, G(z	z), F(z)) and R(H(A, y), A, G(B), y)	where A and B are con	where A and B are constant symbols		
	$\theta = \{ x/A, y \}$	<mark>/A, z/G(B) }</mark>				
b.	R(F(x), A) and R(y, F(w))	where A is a constant s	symbol		
	No MGU. F	or the second argument, we cannot u	nify a constant and a function.			
Oues	tion 2 (2pts	s) Translate the following sentences	from English to First-order log	zic.		
No.	Score (pt)	Sentence		, , , , , , , , , , , , , , , , , , , 		
1	0.25	Any berry is sour or inedible.				
2	0.25	Every pie includes some berries.				
3	0.25	Some pie includes no sweet berry.				
4	0.25	There is no berry that all pies do not include.				
5	0.5	There are at least two sweet berrie	es			
6	0.5	Each berry is either edible or swee	et (but both at different times).			
•	Berry(x): x Edible(x):	ren predicates x is a berry • Sour(x): x is x is edible (whose opp \rightarrow Sour(x) $\vee \neg$ Edible(x)	oosite is sweet) • Include	es(x, y): x includes y		
2.						
3.	3. $\exists x \ \text{Pie(x)} \land [\ \forall y \ \text{Berry(y)} \land \neg \text{Sour(y)} \rightarrow \neg \text{Includes (x, y)}]$					
4.	I. $\neg\exists x \; Berry(x) \land [\forall y \; Pie(y) \rightarrow \neg Includes(y, x)]$					
5.	5. $\exists x, y \ Berry(x) \land \neg Sour(x) \land Berry(y) \land \neg Sour(y) \neg (x = y)$					
6	∀v Dich(v)	> Ediblo(v) < > Sour(v)				
0.	<u>י∧ עי הופווו(ע)</u>	\rightarrow Edible(x) \leftrightarrow \neg Sour(x)				

Stude	ent ID:		Duration: 15 mins	Date: 13/04/2023	
Stude	ent name:			Score:/_3	
		Find the MGU for each of the Otherwise, write No MGU ar	following pairs of clauses. If there exist	sts such an MGU, write	
		(z) and $S(G(u), G(G(z)), z)$	ia jaseny y sur unover.		
-			t the same time		
,			t the same time.		
b.	-	y, y)) S(y, B, z)	where A and B are co	•	
	$\theta = \{ y/A, x/A \}$	'B, z/G(A, A) }			
Ques	tion 2 (2pts) Translate the following sen	tences from English to First-order log	ric.	
No.	Score (pt)	Sentence			
1	0.25	Strawberry is sour, and it is	not an inedible berry.		
2	0.25	Every berry grows in some	gardens.		
3	0.25	There are some gardens that no sweet berry grows.			
4	0.25	Not all berries grow in some gardens.			
5	0.5	There is exactly one inedible berry.			
6	0.5	Each garden has something	that is a berry or inedible (but both a	t different times).	
using	only the giv	en predicates			
•	Berry(x): x	is a berry • Edib	ele(x): x is edible • Garden	(x): x is a garden	
•	Strawberr	y is a constant • Sour		x, y): x grows in y	
		(who	ose opposite is sweet)		
1.	Sour(Straw	berry) ^ ¬Edible(Strawberry) /	∆ Berry(Strawberry)		
	The above	s meaningful. However, the ex	ract translation should be		
	Sour(Straw	berry) ∧ ¬[¬Edible(Strawberr	y) ∧ Berry(Strawberry)]		
2.	∀x Berry(x)	\rightarrow [\exists y Garden(y) \land Grows(x,	<u>y),]</u>		
3.	3. $\exists x Garden(x) \land [\forall y Berry(y) \land \neg Sour(y) \rightarrow \neg Grows(y, x)]$				
4.	4. ¬∀x Berry(x) ∧ → [∃y Garden(y) ∧ Grows(x, y)]				
5.	∃x Berry(x)	$\land \neg Edible(x) \land [\forall y \; Berry(y) \land]$	$\neg Indible(y) \rightarrow \neg (x = y)$		
c	₩v Dormulul	> Ty Ediblo(y) / > Domy(y)			
٥.	vx berry(x)	$\rightarrow \exists \lambda \ criminf(\lambda) \leftrightarrow get(\lambda(\lambda))$			