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For the following items, circle which expressions of PL are correct sentences of PL (according to the rules of syntax for PL):

Klmnop ~~(∀a)Fa~~ ~~(∀x)(∃x)(Fx & Gx)~~

(∀x)Fx & (∃x)Gx **Fa v Gbc** ~~[(())(fvG&~~

For the following items, circle the main logical operator of the sentence of PL, and specify whether the sentence is Atomic, Truth-Functional, or Quantified.

(∀x)(∃z)(Fz & Gx) Quantified_____

~(∃y)Fy ⊃ Tb Truth-Functional_____

~(∃y)(Fy ⊃ Tb) Truth-Functional_____

Fgh Atomic_____

Circle all that apply about the relations listed below:

x is taller than y	Reflexive	Symmetric	Transitive
x loves y	Reflexive	Symmetric	Transitive
x is identical with y	Reflexive	Symmetric	Transitive
x contains y	Reflexive	Symmetric	Transitive

Given the symbolization key below, determine whether the supplied sentences of PL are true or false.

UD: US Presidents
Dx: x is dead
Px: x was president
Lxy: x has a longer first name than y
a: Abraham Lincoln
b: Benjamin Harrison
c: Chester Arthur

_T__. Da & Lbc
_T__. ~Pb ⊃ Lac
_T__. (∃x)(Px & Dx)
_T__. Lca v Lbc

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Given the following symbolization key, turn the below sentences of English into equivalent sentences Of PL

UD: Everything
Lxy: x is located in y
Bx: x brews beer
Oxy: x founded y
x=y: x is identical with y
b: Boston
c: Cambridge
e: Elijah Craig
k: Jim Koch
s: the Boston Beer Company
t: the Blue Sun Company
n(x): the closest company to x

The Boston Beer company is in Boston.

Lsb

The Boston Beer company was founded by Jim Koch

Oks

Someone founded the Blue Sun Company

(∃x)Oxt

All of the breweries are either in Boston or Cambridge

(∀x)[Bx ⊃ (Lxb v Lxc)]

The company that Elijah Craig founded is in Boston

(∃x)(Oex & Lxb)

The Blue Sun Company is the closest company to Boston

t=n(b)

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Given the following symbolization key, turn each of the sentences of PL into equivalent English sentences

UD: Logicians
Ex: x is English
Ax: x is Austrian
Gx: x is Greek
Cx: x is eccentric
Lx: x is a logician
Nxy: x annoys y
Rxy: x read y's book
x=y: x is identical with y
a: Aristotle
g: Gödel
l: Wittgenstein
r: Russell
t: Tarski
s(x): the student of x

Er & Ga

Russell is English and Aristotle is Greek

Ct $\supset$ Ntg

If Tarski is eccentric, then he annoys Gödel

($\forall$x)(Rxl & Rxa)

All logicians read Wittgenstein's and Aristotle's books.

~($\forall$x)(Lx $\supset$ Ex)

Not all logicians are English

~($\exists$z)(Az & Gz)

No Austrians are Greeks

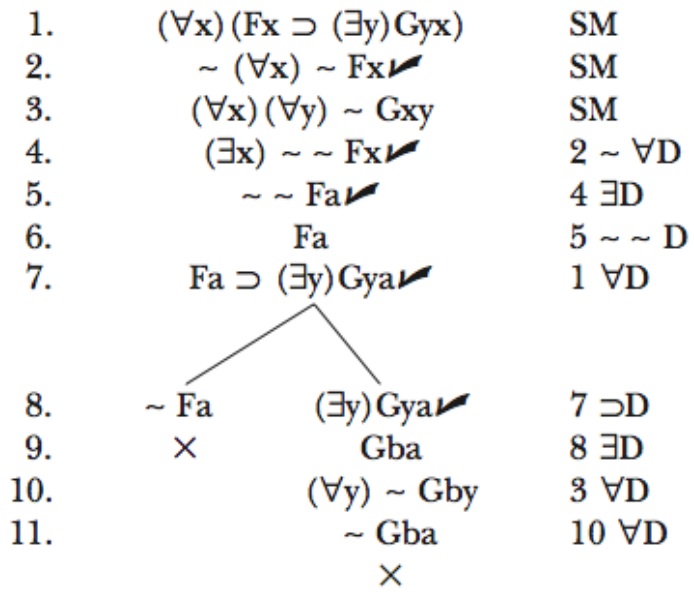
l=*s*(r)

Wittgenstein is Russell's student

($\forall$y)(Ryr $\supset$ y=g)

Only Gödel read Russell's book

What information does this semantic tree contain? Circle all that apply.



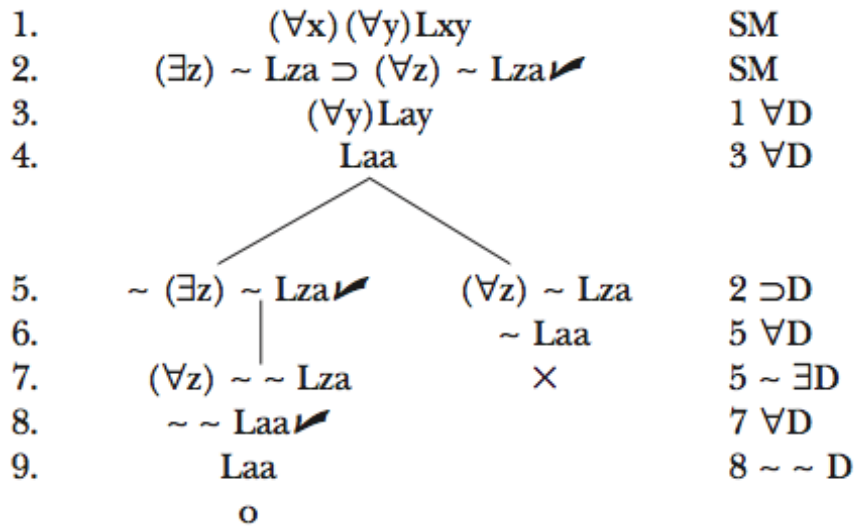
{(∀x)(Fx ⊃ (∃y)Gyx), ~(∀x)~Fx, (∀x)(∀y)~Gxy} is consistent

{(∀x)(Fx ⊃ (∃y)Gyx), ~(∀x)~Fx} entails (∀x)(∀y)~Gxy

<u>{(∀x)(Fx ⊃ (∃y)Gyx), (∀x)(∀y)~Gxy } entails (∀x)~Fx</u>

(∀x)(Fx ⊃ (∃y)Gyx), ~(∀x)~Fx}, and (∀x)(∀y)~Gxy are all equivalent

What information does this semantic tree contain? Circle all that apply.



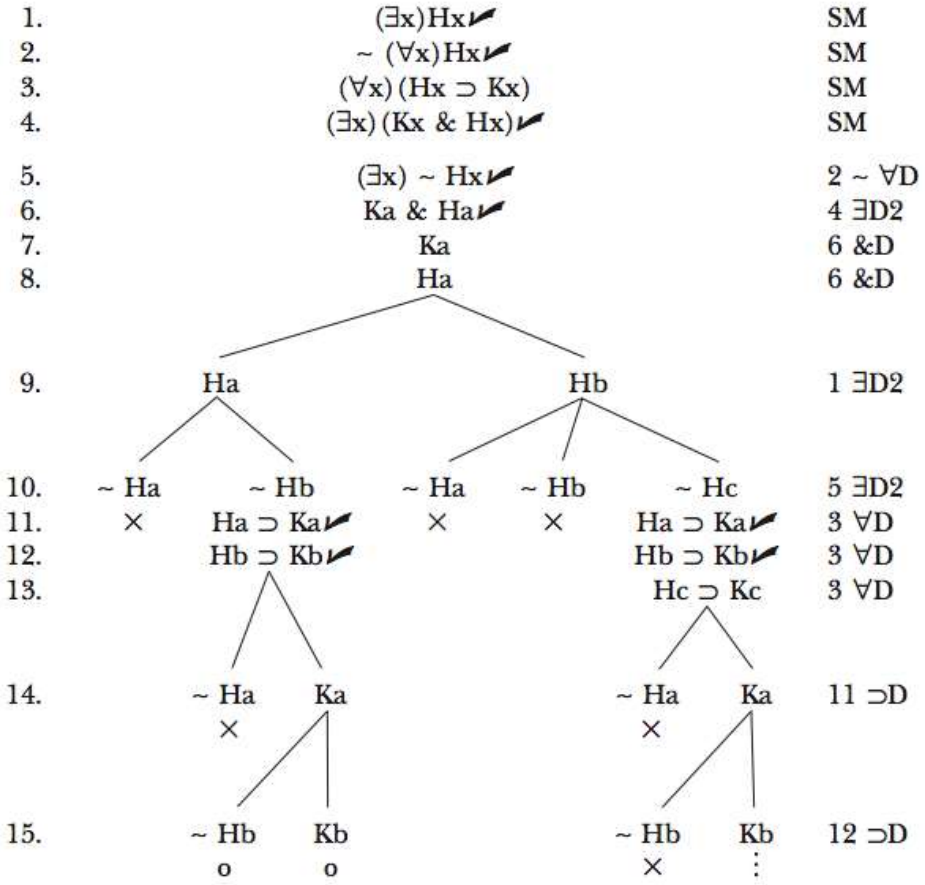
{(∃z)~Lza ⊃ (∀z)~Lza, (∀x)(∀y)Lxy} is consistent

[(∃z)~Lza) ⊃ (∀z)~Lza] & [(∀x)(∀y)Lxy] is not a contradiction

(∃z)~Lza ⊃ (∀z)~Lza is not a contradiction

~(∀x)(∀y)Lxy is not a contradiction

*What is **true** of the following tree? Circle all that apply.*



<u>This is a systematic tree.</u>

This tree has more than one non-terminating branch.

<u>The set tested in this tree is consistent.</u>

This tree is closed.

<u>This tree has more than one completed open branch.</u>

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Using the space provided, complete the following semantic tree (be sure to justify each line):

1. $(\forall x)(Hx \equiv \sim Ix)$		SM
2. $\sim(\exists x)\sim Ix$	√	SM
3. $\sim(\forall x)\sim Hx$	√	SM
4. $(\forall x)Ix$		2, $\sim\exists$D
5. $(\exists x)Hx$	√	3, $\sim\forall$D
6. Ha		5, $\exists$D
7. $Ha \equiv \sim Ia$	√	1, $\forall$D
8. $\sim Ha$	Ha	7 ≡D
9. $\sim\sim Ia$	$\sim Ia$	7 ≡D
10. X	Ia	4, $\forall$D
	X	

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Using the space provided, complete the following semantic tree (be sure to justify each line):

1. ~(∃x)(Bx v Cxa) √				SM
2. (∀w)(Dw & (∃y)Cwy)				SM
3. (∀x)~(Bx v Cxa)				1, ~∃D
4. Da & (∃y)Cay √				2, ∀D
5. Da				4, &D
6. (∃y)Cay √				4, &D
7. Caa	Cab			6, ∃D2
8. ~(Ba v Caa)√	~(Ba v Caa)√			3, ∀D
9. ~Ba	~Ba			8, ~vD
10.~Caa	~Caa			8, ~vD
11. X	Db & (∃y)Cby			2, ∀D
12.	Db			11, &D
13.	(∃y)Cby			11, &D
14. Cba	Cbb	Cbc		13, ∃D2
15. ~(Bb v Cba)	~(Bb v Cba)	~(Bb v Cba)		3, ∀D
16. ~Bb	~Bb	~Bb		15, ~vD
17. ~Cba	~Cba	~Cba		15, ~vD
X	o	…		