

COGS543 Assignment 2

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Question 1:

<u>John</u>	<u>or</u>	<u>Mary</u>	<u>studied</u>	<u>and</u>	<u>passed</u>
$S/(S \setminus NP)$	$(X \setminus X)/X$	$S/(S \setminus NP)$	$S \setminus NP$	$(Y \setminus Y)/Y$	$S \setminus NP$
$\lambda p.pj'$	$\lambda p\lambda q\lambda x.(qx) \vee (px)$	$\lambda p.pm'$	$\lambda x.study'x$	$\lambda p\lambda q\lambda x.(qx) \wedge (px)$	$\lambda x.pass'x$
$\langle\langle e,t\rangle,t\rangle$	$\langle\langle\langle e,t\rangle,t\rangle,\langle\langle\langle e,t\rangle,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle\rangle$	$\langle\langle e,t\rangle,t\rangle$	$\langle e,t\rangle$	$\langle\langle e,t\rangle,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle$	$\langle e,t\rangle$
$\text{-----} >$			$\text{-----} >$		
$(S/(S \setminus NP)) \setminus (S/(S \setminus NP))$			$(S \setminus NP) \setminus (S \setminus NP)$		
$\lambda q\lambda x.(qx) \vee ((\lambda p.pm')x)$			$\lambda q\lambda x.(qx) \wedge (pass'x)$		
$\langle\langle\langle e,t\rangle,t\rangle,\langle\langle e,t\rangle,t\rangle\rangle$			$\langle\langle e,t\rangle,\langle e,t\rangle\rangle$		
$\text{-----} <$			$\text{-----} <$		
$S/(S \setminus NP)$			$S \setminus NP$		
$\lambda x.((\lambda q.qj')x) \vee ((\lambda p.pm')x)$			$\lambda x.(study'x) \wedge (pass'x)$		
$\langle\langle e,t\rangle,t\rangle$			$\langle e,t\rangle$		
$\text{-----} >$					
S					
$((study'j') \wedge (pass'j')) \vee ((study'm') \wedge (pass'm'))$					
t					

or = $((S/(S \setminus NP)) \setminus (S/(S \setminus NP)))/(S/(S \setminus NP))$

and = $((S \setminus NP) \setminus (S \setminus NP))/(S \setminus NP)$

Question 2:

<u>A</u>	<u>boy</u>	<u>and</u>	<u>every</u>	<u>girl</u>	<u>passed</u>
$(S/(S \setminus NP))/N$	N	$(X \setminus X)/X$	$(S/(S \setminus NP))/N$	N	$S \setminus NP$
$\lambda y \lambda v \exists x. (yx) \wedge (vx)$	$\lambda x. boy'x$	$\lambda p \lambda q \lambda r. (qr) \wedge (pr)$	$\lambda w \lambda z \forall x. (wx) \rightarrow (zx)$	$\lambda x. girl'x$	$\lambda x. pass'x$
$\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$	$\langle e, t \rangle$	$\langle \langle \langle e, t \rangle, t \rangle, \langle \langle \langle e, t \rangle, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle \rangle$	$\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$	$\langle e, t \rangle$	$\langle e, t \rangle$
$\text{-----} >$			$\text{-----} >$		
$S/(S \setminus NP)$			$S/(S \setminus NP)$		
$\lambda v \exists x. (boy'x) \wedge (px)$			$\lambda z \forall x. (girl'x) \rightarrow (zx)$		
$\langle \langle e, t \rangle, t \rangle$			$\langle \langle e, t \rangle, t \rangle$		
			$\text{-----} >$		
			$(S/(S \setminus NP)) \setminus (S/(S \setminus NP))$		
			$\lambda q \lambda r. (qr) \wedge ((\lambda z \forall x. (girl'x) \rightarrow (zx))r)$		
			$\langle \langle \langle e, t \rangle, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$		
$\text{-----} <$					
$S/(S \setminus NP)$					
$\lambda r. ((\lambda v \exists x. (boy'x) \wedge (vx))r) \wedge ((\lambda z \forall x. (girl'x) \rightarrow (zx))r)$					
$\langle \langle e, t \rangle, t \rangle$					
			$\text{-----} >$		
			S		
			$(\exists x. (boy'x) \wedge (pass'x)) \wedge (\forall x. (girl'x) \rightarrow (pass'x))$		
			t		

$$\text{and} = ((S/(S \setminus NP)) \setminus (S/(S \setminus NP)))/(S/(S \setminus NP))$$