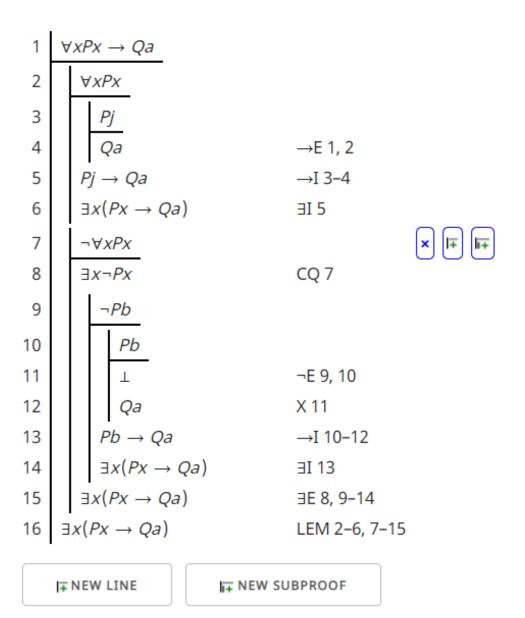
Gabarito – Lógica de Predicados

Questão 2.

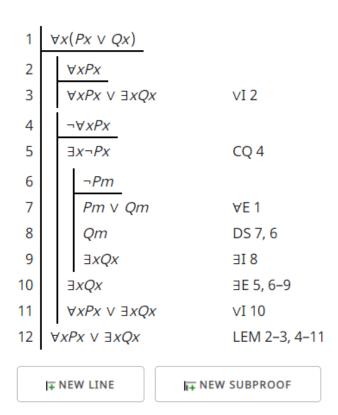
a)

Construct a proof for the argument: $\forall xPx \rightarrow Qa :: \exists x(Px \rightarrow Qa)$



© Congratulations! This proof is correct.

Construct a proof for the argument: $\forall x (Px \lor Qx) :: \forall x Px \lor \exists x Qx$



© Congratulations! This proof is correct.

d)

Construct a proof for the argument: $\forall x (\neg Px \land Qx) :: \forall x (Px \rightarrow Qx)$

1
$$\forall x(\neg Px \land Qx)$$

2 Pa
3 $\neg Pa \land Qa$ $\forall E 1$
4 $\neg Pa$ $\land E 3$
5 \bot $\neg E 4, 2$
6 Qa $X 5$
7 $Pa \rightarrow Qa$ $\rightarrow I 2-6$
8 $\forall x(Px \rightarrow Qx)$ $\forall I 7$

 $\ensuremath{\odot}$ Congratulations! This proof is correct.

Construct a proof for the argument: $\forall x (Px \land Qx) :: \forall x (Px \rightarrow Qx)$

1
$$\forall x(Px \land Qx)$$

2 Pa
3 $Pa \land Qa$ $\forall E 1$
4 Qa $\land E 3$
5 $Pa \rightarrow Qa$ $\rightarrow I 2-4$
6 $\forall x(Px \rightarrow Qx)$ $\forall I 5$

© Congratulations! This proof is correct.

f)

Construct a proof for the argument: $\exists x (\neg Px \land \neg Qx) :: \exists x \neg (Px \land Qx)$

1
$$\exists x (\neg Px \land \neg Qx)$$

2 $\neg Pa \land \neg Qa$
3 $Pa \land Qa$
Pa $\land E 3$
5 $\neg Pa$ $\land E 2$
6 \bot $\neg E 5, 4$
7 $\neg (Pa \land Qa)$ $\neg E 3 \rightarrow E 5, A$
8 $\exists x \neg (Px \land Qx)$ $\exists E 1, 2 - 8$
FINEW LINE

② Congratulations! This proof is correct.

Construct a proof for the argument: $\forall x (Px \land Qx) :: \forall x Px \land \forall x Qx$

1
$$\forall x(Px \land Qx)$$

2 $Pa \land Qa$ $\forall E 1$
3 Pa $\land E 2$
4 $\forall xPx$ $\forall I 3$
5 Qa $\land E 2$
6 $\forall xQx$ $\forall I 5$
7 $\forall xPx \land \forall xQx$ $\land I 4, 6$

© Congratulations! This proof is correct.

i)

Construct a proof for the argument: $\forall xPx \lor \forall xQx :: \forall x(Px \lor Qx)$

☺ Congratulations! This proof is correct.

j)

Construct a proof for the argument: $\exists x(Px \land Qx) :: \exists xPx \land \exists xQx$

1
$$\exists x(Px \land Qx)$$
2 $Pa \land Qa$
3 Pa $\land E 2$
4 $\exists xPx$ $\exists I 3$
5 Qa $\land E 2$
6 $\exists xQx$ $\exists I 5$
7 $\exists xPx \land \exists xQx$ $\land I 4, 6$
8 $\exists xPx \land \exists xQx$ $\exists E 1, 2-7$

© Congratulations! This proof is correct.

1)

Construct a proof for the argument: $\forall x \forall y (Sy \rightarrow Fx) : \exists ySy \rightarrow \forall xFx$

1
$$\forall x \forall y (Sy \rightarrow Fx)$$

2 $\exists ySy$
3 $\forall y (Sy \rightarrow Fa)$ $\forall E 1$
4 $Sb \rightarrow Fa$ $\forall E 3$
5 $|Sb|$
6 $|Fa|$ $\rightarrow E 4, 5$
7 $|Fa|$ $\exists E 2, 5-6$
8 $|\forall xFx|$ $\forall I 7$
9 $\exists ySy \rightarrow \forall xFx$ $\rightarrow I 2-8$

© Congratulations! This proof is correct.

m)

Construct a proof for the argument: $Pb :: \forall x(x = b \rightarrow Px)$

1
$$Pb$$

2 $a = b$
3 Pa $= E 2, 1$
4 $a = b \rightarrow Pa$ $\rightarrow I 2-3$
5 $\forall x(x = b \rightarrow Px)$ $\forall I 4$

∓ NEW LINE

I NEW SUBPROOF

© Congratulations! This proof is correct.