Exercício 1

1.		$\exists x(P(x) \wedge Q(x))$	premissa
2.	$x0$	$P(x0) \wedge Q(x0)$	hipótese
3.		$P(x0)$	$\wedge e$ 2
4.		$Q(x0)$	$\wedge e$ 2
5.		$\exists x P(x)$	$\exists i$ 3
6.		$\exists x Q(x)$	$\exists i$ 4
7.		$\exists x P(x) \wedge \exists x Q(x)$	$\wedge i$ 5,6
8.		$\exists x P(x) \wedge \exists x Q(x)$	$\exists e$ 1,2-7

Exercício 2

1.		$\exists x P(x) \vee \exists x Q(x)$	premissa
2.		$\exists x P(x)$	hipótese
3.	$x0$	$P(x0)$	hipótese
4.		$P(x0) \vee Q(x0)$	$\vee i$ 3
5.		$\exists x(P(x) \vee Q(x))$	$\exists i$ 4
6.		$\exists x(P(x) \vee Q(x))$	$\exists e$ 2,3-5
7.		$\exists x Q(x)$	hipótese
8.	$x0$	$Q(x0)$	hipótese
9.		$P(x0) \vee Q(x0)$	$\vee i$ 8
10.		$\exists x(P(x) \vee Q(x))$	$\exists i$ 9
11.		$\exists x(P(x) \vee Q(x))$	$\exists e$ 7,8-10
12.		$\exists x(P(x) \vee Q(x))$	$\vee e$ 1, 2-6, 7-11

Exercício 3 - solução 1

1.		$\forall x \forall y(Q(y) \rightarrow P(x))$	premissa
2.		$\exists y Q(y)$	hipótese
3.	$x0$		
4.	$y0$	$Q(y0)$	hipótese
5.		$\forall y(Q(y) \rightarrow P(x0))$	$\forall e$ 1
6.		$Q(y0) \rightarrow P(x0)$	$\forall e$ 5
7.		$P(x0)$	$\rightarrow e$ 6, 4
8.		$P(x0)$	$\exists e$ 2,4-7
9.		$\forall x P(x)$	$\forall i$ 3-8
10.		$\exists y Q(y) \rightarrow \forall x P(x)$	$\rightarrow i$ 2-9

Exercício 3 - solução 2

1.		$\forall x \forall y(Q(y) \to P(x))$	premissa
2.		$\exists y Q(y)$	hipótese
3.	$y0$	$Q(y0)$	hipótese
4.	$x0$		
5.		$\forall y(Q(y) \to P(x0))$	$\forall e$ 1
6.		$Q(y0) \to P(x0)$	$\forall e$ 5
7.		$P(x0)$	$\to e$ 6, 3
8.		$\forall x P(x)$	$\forall i$ 4-7
9.		$\forall x P(x)$	$\exists e$ 2,3-8
10.		$\exists y Q(y) \to \forall x P(x)$	$\to i$ 2-9