a)

1	A ∧ B	PR
2	B	∧E 1

b)

1	A	PR
2	A ∨ B	∨I 1

c)

1	C ∧ (B → ¬F)	PR
2	C	∧E 1

d)

1	A ∧ B	PR
2	A	∧E 1
3	B	∧E 1
4	B ∧ A	∧I 2,3

e)

1	A ∨ B	PR
2	A	AS
3	A ∨ B	∨I 2
4	B	AS
5	A ∨ B	∨I 4
6	A ∨ B	∨E 1, 2-3, 4-5

f)

1	(A ∧ C) ∨ (B ∧ A)	PR
2	A ∧ C	AS
3	A	∧E 2
4	B ∧ A	AS
5	A	∧E 4
6	A	∨E 1, 2-3, 4-5

g)

1	A → B	PR
2	B → C	PR
3	A	AS
4	B	→E 1,3
5	C	→E 2,4
6	A → C	→I 3-5

h)

1	A	PR
2	A → B	PR
3	B	→E 1,2
4	B ∨ C	∨I 3

i)

1	A ↔ B	PR
2	A	AS
3	B	↔E 1,2
4	B	AS
5	A	↔E 1,4
6	B ↔ A	↔I 1, 2-3, 4-5

j)

1	A ↔ (B ∧ C)	PR
2	C	PR
3	B ∧ D	PR
4	B	∧E 3
5	B ∧ C	∧I 2,4
6	A	↔E 1,5

k)

1	$(A \lor B) \to C$		PR
2	$A \land D$		PR
3	A		$\land$E 2
4	$A \lor B$		$\lor$I 3
5	C		$\to$E 1,4

l)

1	$(A \lor B) \to C$		PR
2	A		AS
3	B		AS
4	$A \land B$		$\land$I 2,3
5	C		$\to$E 1,4
6	$B \to C$		$\to$I 3-5
7	$A \to (B \to C)$		$\to$I 2-6

m)

1	$B \to A$		PR
2	$B \lor (D \land E)$		PR
3	$D \to A$		PR
4	B		AS
5	A		$\to$E 4,1
6	$D \land E$		AS
7	D		$\land$E 6
8	A		$\to$E 3,7
9	A		$\lor$E 2, 4-5, 6-8
10	$A \lor E$		$\lor$I 9

n)

1	$(A \to B) \lor (A \to C)$		PR
2	A		AS
3	$A \to B$		AS
4	B		$\to$E 2,3
5	$B \lor C$		$\lor$I 4
6	$A \to C$		AS
7	C		$\to$E 2,6
8	$B \lor C$		$\lor$I 7
9	$B \lor C$		$\lor$E 1, 3-5, 6-8
10	$A \to (B \lor C)$		$\to$I 2-9