5.4.xa. Exercise answers

1. a.

	$A \to B$	2		$\neg A \lor B$	2
	A	(2)		A	(2)
2 MPP	B	(3)	2 MTP	B	(3)
	●			●	
3 QED	B	1	3 QED	B	1
1 PE	$\neg A \lor B$		1 CP	$A \to B$	

b.

	$(A \land B) \to C$	3
	A	(4)
	$\neg C$	(3)
3 MTT	$\neg (A \land B)$	4
4 MPT	$\neg B$	
	○	$A, \neg C, \neg B \nRightarrow \bot$
	$\bot$	2
2 IP	C	1
1 CP	$A \to C$	

	$A \to C$	3
	$A \land B$	2
2 Ext	A	(3)
2 Ext	B	
3 MPP	C	(4)
	●	
4 QED	C	1
1 CP	$(A \land B) \to C$	

A B C	$(A \land B) \to C$ / $A \to C$	
T F F	F Ⓣ	Ⓕ

c.

	$A \to C$	3,7
	A	(3)
3 MPP	C	
	$\neg B$	
	○	$A, C, \neg B \nRightarrow \bot$
	$\bot$	4
4 IP	B	2
2 CP	$A \to B$	1
	B	
	$\neg C$	(7)
7 MTT	$\neg A$	
	○	$B, \neg C, \neg A \nRightarrow \bot$
	$\bot$	6
6 IP	C	5
5 CP	$B \to C$	1
1 Cnj	$(A \to B) \land (B \to C)$	

	$(A \to B) \land (B \to C)$	1
1 Ext	$A \to B$	3
1 Ext	$B \to C$	4
	A	(3)
3 MPP	B	(4)
4 MPP	C	(5)
	●	
5 QED	C	2
2 CP	$A \to C$	

A B C	$A \to C$ / $(A \to B) \land (B \to C)$			
T F T	Ⓣ	F	Ⓕ	T
F T F	Ⓣ	T	Ⓕ	F

d. The following are two approaches to this derivation, one without use of attachment rules and the other using one of the forms of Wk for the conditional.
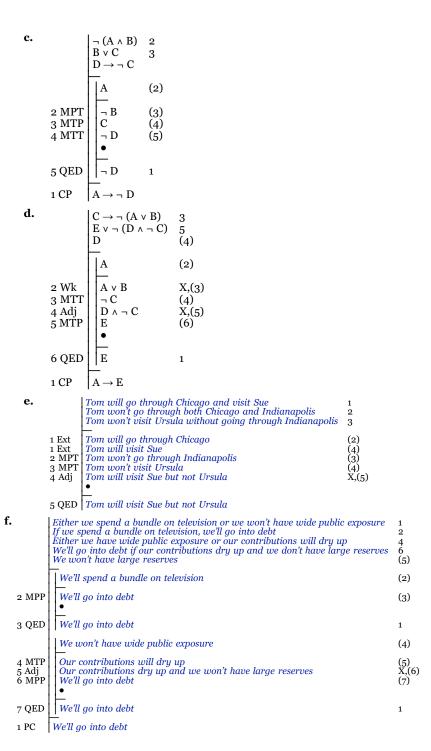
Left derivation:

	$(A \rightarrow B) \rightarrow A$	3
	$\neg A$	(3),(7)
3 MTT	$\neg (A \rightarrow B)$	
	A	(7)
	$\neg B$	
	●	
7 Nc	⊥	6
6 IP	B	5
5 CP	$A \rightarrow B$	4
4 CR	⊥	2
2 IP	A	1
1 CP	$((A \rightarrow B) \rightarrow A) \rightarrow A$	

Right derivation:

	$(A \rightarrow B) \rightarrow A$	4
	$\neg A$	(3),(5)
3 Wk	$A \rightarrow B$	X,(4)
4 MPP	A	(5)
	●	
5 Nc	⊥	2
2 IP	A	1
1 CP	$((A \rightarrow B) \rightarrow A) \rightarrow A$	

2. a.

	$(A \wedge B) \rightarrow C$	2
	$(C \vee D) \rightarrow E$	4
	A	(1)
	B	(1)
1 Adj	$A \wedge B$	X,(2)
2 MPP	C	(3)
3 Wk	$C \vee D$	X,(4)
4 MPP	E	(5)
	●	
5 QED	E	

b.

	$(A \vee \neg B) \rightarrow C$	2
	$\neg C$	(2)
2 MTT	$\neg (A \vee \neg B)$	(5)
	$\neg B$	(4)
4 Wk	$A \vee \neg B$	X,(5)
	●	
5 Nc	⊥	3
3 IP	B	1
1 CP	$\neg C \rightarrow B$	

c.

```
    ¬ (A ∧ B)    2
    B ∨ C        3
    D → ¬ C

        A            (2)

2 MPT   ¬ B          (3)
3 MTP   C            (4)
4 MTT   ¬ D          (5)
        ●

5 QED   ¬ D          1

1 CP    A → ¬ D
```

d.

```
    C → ¬ (A ∨ B)    3
    E ∨ ¬ (D ∧ ¬ C)  5
    D                (4)

        A            (2)

2 Wk    A ∨ B        X,(3)
3 MTT   ¬ C          (4)
4 Adj   D ∧ ¬ C      X,(5)
5 MTP   E            (6)
        ●

6 QED   E            1

1 CP    A → E
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e.

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        Tom will go through Chicago and visit Sue                        1
        Tom won't go through both Chicago and Indianapolis               2
        Tom won't visit Ursula without going through Indianapolis        3

1 Ext   Tom will go through Chicago                                      (2)
1 Ext   Tom will visit Sue                                               (4)
2 MPT   Tom won't go through Indianapolis                                (3)
3 MPT   Tom won't visit Ursula                                           (4)
4 Adj   Tom will visit Sue but not Ursula                                X,(5)
        ●

5 QED   Tom will visit Sue but not Ursula
```

f.

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    Either we spend a bundle on television or we won't have wide public exposure    1
    If we spend a bundle on television, we'll go into debt                          2
    Either we have wide public exposure or our contributions will dry up            4
    We'll go into debt if our contributions dry up and we don't have large reserves 6
    We won't have large reserves                                                    (5)

        We'll spend a bundle on television                                          (2)

2 MPP   We'll go into debt                                                          (3)
        ●

3 QED   We'll go into debt                                                          1

        We won't have wide public exposure                                          (4)

4 MTP   Our contributions will dry up                                               (5)
5 Adj   Our contributions dry up and we won't have large reserves                   X,(6)
6 MPP   We'll go into debt                                                          (7)
        ●

7 QED   We'll go into debt                                                          1

1 PC    We'll go into debt
```

g.

	If Adams supports the plan, it will go though provided Brown doesn't oppose it	3
	Brown won't oppose the plan if either Collins or Davis supports it	5
	Both Adams and Davis will support the plan	2
2 Ext	*Adams will support the plan*	(3)
2 Ext	*Davis will support the plan*	(4)
3 MPP	*The plan will go though provided Brown doesn't oppose it*	6
4 Wk	*Either Collins or Davis will support the plan*	X,(5)
5 MPP	*Brown won't oppose the plan*	(6)
6 MPP	*The plan will go through*	(7)
	●	
7 QED	*The plan will go through*	1
1 CP	*The plan will go through if both Adams and Davis support it*	

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