Phil 225 -- Symbolic Logic
HW#6 Possible Answers

(2) Chapt. 6, Ex. 7

d)		{1}	(1) $P \rightarrow Q$	P
		{2}	(2) $R \rightarrow \ -S$	P
		{3}	(3) $S \rightarrow P$	P
	$S \rightarrow T$	{4}	(4) $Q \rightarrow R$	P

	T	{5}	(5) S	P (for C)
		{3,5}	(6) P	3,5 MP
		{1,3,5}	(7) Q	1,6 MP
		{1,3,4,5}	(8) R	4,7 MP
		{1,2,3,4,5}	(9) – S	2,8 MP
		{1,2,3,4,5}	(10) $S \wedge -S$	5,9 CI
		{1,2,3,4,5}	(11) T	10 RAA
		{1,2,3,4}	(12) $S \rightarrow T$	5,11 C

f)		{1}	(1) $P \rightarrow R$	P
		{2}	(2) $Q \rightarrow -S$	P
	$P \rightarrow -S$	{3}	(3) $R \rightarrow Q$	P

	–S	{4}	(4) P	P (for C)
		{1,4}	(5) R	1,4 MP
		{1,3,4}	(6) Q	5,3 MP
		{1,2,3,4}	(7) – S	2,6 MP
		{1,2,3}	(8) $P \rightarrow \ -S$	4,7 C

(3) (a)

(i) – T → S is **not** a consequence of the premises. In any domain, let R: T , S: F, T:F. Then the premises are both true, but – T is false.

(ii) – T is a consequence

	{1}	(1) –(R → S)	P
–T	{2}	(2) R → (S v –T)	
	{1}	(3) R & –S	1, TH (De Morgan)
	{1}	(4) R	3, CE
	{1,2}	(5) S v –T	2,4, MP
	{1}	(6) –S	3, CE
	{1,2}	(7) –T	5,6, DE_1

(b)

(i) – S is **not** a consequence. In any domain, let R: T , S: T , T: F. Then the premises are both true, but – S is false.

(ii) –T is a consequence. It can be derived most naturally via DE_2, which we haven't covered yet in class; but it can be derived easily enough without it too. I'll show both derivations.

	{1}	(1) (R → S) v (R & –T)	
–T	{2}	(2) R & (T ↔ –S)	
X	{4}	(4) T	P (for RAA)
	{2}	(5) R	2, CE
	{2}	(6) T ↔ –S)	2, CE
	{2,4}	(7) –S	4,6, BE
	{2,4}	(8) R & –S	5,7,CI
	{2,4}	(9) –(R → S)	8, R (De Morg)
	{1,2,4}	(10) R & –T	1,9, DE_1
	{1,2,4}	(11) –T	10, CE
	{1,2,4}	(12) T & –T	4,11, CI
	{1.2}	(13) –T	4, 12, RAA

	{1}	(1) (R → S) v (R & –T)	P
–T	{2}	(2) R & (T ↔ –S)	P
–T	{3}	(3) R → S	P (for DE_2)
	{2}	(4) R	2, CE
	{2,3}	(5) S	3,4,MP
	{2}	(6) T ↔ –S	2, CE
	{2,3}	(7) –T	5,6,BE

{2}	(8) (R → S) → –T	3,7,C
{9}	(9) (R & –T)	P (for DE_2
{9}	(10 –T	9, CE
Λ	(11) (R & –T) → –T	9,10, C
{1,2}	(12) –T	1, 8, 11, DE_2