Introduction to Mathematical Thinking
Assignment 3 Solutions

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1. (a) $T \Rightarrow (D \wedge Y)$

   (b) $D \Rightarrow (\neg Y)$

   (c) $\neg D \Rightarrow \neg T$

   (d) $T \Rightarrow \neg(D \wedge Y)$

   (e) $T \Rightarrow (\neg D \wedge Y)$

   (f) $T \Rightarrow Y \Rightarrow \neg D$

   (g) $T \Rightarrow (\neg(D \wedge Y) \vee (D \wedge Y))$ ** Equivalent to Exclusive NOR **

   (h) $T \Rightarrow ((\neg D \wedge Y) \vee (D \wedge \neg Y))$ ** Equivalent to Exclusive OR **

2. TRUTH TABLE

ϕ	$\neg\phi$	ψ	$\phi \Rightarrow \psi$	$\neg\phi \vee \psi$
T	F	T	T	T
T	F	F	F	F
F	T	T	T	?T
F	T	F	T	T

3. The last two columns of the above truth table are equivalent.

4. TRUTH TABLE

ϕ	ψ	$\neg\psi$	$\phi \Rightarrow \psi$	$\neg(\phi \Rightarrow \psi)$	$\phi \wedge \neg\psi$
T	T	F	T	F	F
T	F	T	F	T	T
F	T	F	T	F	F
F	F	T	T	F	F

5. The last two columns of the above truth table are equivalent.