The Required Format for Statement Deductions from a Premise List

1. Write out the list of premises of the deduction in full with each premise labeled by a letter.
2. Write "To deduce:" followed by the statement to be deduced.
3. Under the heading "Deduction," write a list of standard valid argument forms in "two column" format with column headings "Statement" and "Justification." Note: The arguments in the list must be labeled by counting numbers, 1, 2, 3, ... The statements in these arguments appear in the "Statement" column and their justifications appear in the "Justification" column.
4. In each argument presented, each premise statement must be one of the following:
   - i. one of the given premises in the original premise list,
   - ii. the conclusion from a valid argument presented earlier in the list, or
   - iii. a statement which is logically equivalent to a given original premise or to a previous conclusion.
5. The conclusion of the argument is separated from the premises of the argument by a horizontal line and the statement is preceded by the "Therefore" symbol (∴).
6. Each statement is followed by an appropriate phrase in the "Justification" list, as described below:

Following a premise statement is the phrase "by premise (letter)" or by the phrase "by argument (#)," whichever is appropriate. If the premise statement is equivalent to a given premise or to the conclusion of a previous argument, the phrase should be extended to read

"by premise (*letter*) equivalence using *equivalence law*,"

or

"by argument (#) equivalence using *equivalence law*."

Following a conclusion statement is the phrase " by *argument form* ." indicating the standard valid argument form of the argument being listed.

A correct deduction has only valid arguments listed and has the statement to be deduced as the conclusion of the final argument in the argument list.

EXAMPLE DEDUCTION #1

List of Given Premises:

a) $(a \wedge b) \rightarrow p$
b) $a \wedge d$
c) $b \vee q$
d) $\sim q$

To deduce: p

List of Given Premises:

If $x = 10$ and $y \geq 3$, then $y \leq 5$.
$x = 10$ and $z = 7$.
$y \geq 3$ OR $t = 20$
$t \neq 20$
$\therefore y \leq 5$

x, y, z and t have been defined as integers

Deduction:

	Statement	Justification	
1.	$a \wedge d$	by premise (b)	
	$\therefore$ a	by Specialization	$\therefore x = 10$
2.	$b \vee q$	by premise (c)	
	$\sim q$	by premise (d)	
	$\therefore$ b	by Elimination	$\therefore y \geq 3$
3.	a	by argument (1)	
	b	by argument (2)	
	$\therefore a \wedge b$	by Conjunction	$\therefore x = 10$ AND $y \geq 3$
4.	$(a \wedge b) \rightarrow p$	by premise (a)	
	$(a \wedge b)$	by argument (3)	
	$\therefore$ p	by *modus ponens*	$\therefore y \leq 5$

EXAMPLE DEDUCTION #2

List of Given Premises:

a) $\sim p$
b) a
c) $(a \wedge b) \rightarrow p$

To deduce: $\sim b$

Deduction:

Statement	Justification
1. $(a \wedge b) \rightarrow p$	by premise (c)
$\sim p$	by premise (a)
$\therefore \sim (a \wedge b)$	by *modus tollens*
2. $\sim a \vee \sim b$	by argument (1) equivalence using De Morgan's Law
$\sim\sim a$	by premise (b) equivalence using Double Negative Law
$\therefore \sim b$	by Elimination

Exercise Deduction: List of Given Premises:

a) $(\sim p \vee q) \rightarrow r$
b) $s \vee \sim q$
c) $\sim t$
d) $p \rightarrow t$
e) $(\sim p \wedge r) \rightarrow \sim s$

To deduce: $\sim q$

Hints: Work to deduce $\sim s$ for use with (b) in an Elimination argument. To do this, work to deduce $\sim p \wedge r$ for use with (e) in Modus Ponens. To do this, deduce $\sim p$ using Modus Tollens; deduce $(\sim p \vee q)$ using Generalization; deduce r using Modus Ponens; and deduce $(\sim p \wedge r)$ using Conjunction.