APPENDIX B

PATTERNS OF PROOF

$-p$	**$p \vee q$**	**$p \wedge q$**	**$p \rightarrow q$**
Suppose p	Suppose p	....	Suppose p
....	is false	Hence p	....
Contradiction!	....	....	....
Hence p	Hence q	Hence q	Hence q

$p \rightarrow -q$	**$-p \rightarrow -q$**	**$p \leftrightarrow q$**
Suppose p	Suppose q	Suppose p
Suppose q	....	....
....	....	Hence q
Contrad’n!	Hence p	Now suppose q
		....
		Hence p

$p \vee q \rightarrow r$	**$p \wedge q \rightarrow r$**	**$p \rightarrow q \vee r$**
Case I	Suppose p	Suppose p
Suppose p	Suppose q	Suppose q
....	....	is false
Hence r	Hence r	....
Case II		Hence r
Suppose q		
....		
Hence r		

$\exists x \in S\ [Px]$	$\forall x \in S\ [Px]$	$\forall x \in S\ [Px \rightarrow Qx]$
Let x = ...	Let $x \in S$	Let $x \in S$
....	....	Suppose Px
....	....	....
Hence Px	Hence Px	Hence Qx

PROOF BY INDUCTION

ALL SIX STEPS MUST BE PRESENT
(1) **CHECK** the first value
(2) **SUPPOSE** result is true for n
(3) **CONSIDER** the $n+1$ case
(4) **RELATE** it to the n case
(5) **USE** induction hypothesis to prove the n+1 case
(6) **CONCLUDE** proof by appealing to the induction principle

EXAMPLE: Prove $T_n = n(n-3)$is even for all $n \geq 3$.
(1) If n = 3, $T_n = 3 \times 0 = 0$ which is even. Hence the statement holds for n = 3.
(2) Suppose the statement holds for n i.e. suppose T_n is even
(3) $T_{n+1} = (n+1)(n+1-3) = (n+1)(n-2) = n^2 - n - 2$
(4) $\qquad = (n^2 - 3n) + 2n - 2 = T_n + 2(n-1)$
(5) Since T_n is even (by assumption)and $2(n-1)$ is even, then T_{n+1} is even.
(6) Hence by induction, T_n is even for all $n \geq 3$.