APPENDIX B

PATTERNS OF PROOF

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

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

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

$\exists x \in S\ [Px]$	$\forall x \in S\ [Px]$	$\forall x \in S\ [Px \to Qx]$
Let x = ... Hence Px	Let $x \in S$ .... Hence Px	Let $x \in S$ Suppose 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) $= (n^2 - 3n) + 2n - 2 = T_n + 2(n-1)$
(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 $n \geq 3$.