

Show that the following are theorems of PL. You may use TFC but you are not allowed to take any other derived rules for granted:

- (i) $A(y) \supset \exists x A(x)$;
- (ii) $\exists x(A \ \& \ B) \supset \exists x A$;
- (iii) $\exists x(A \vee B) \equiv (\exists x A \vee \exists x B)$;
- (iv) $\exists x(A(x) \supset \forall x A(x))$.