Chapter 1

Library cantor

```
Require Import Bool.

Section Cantor.

Lemma negb_prop : ∀ a:bool, negb a =a → False.
Proof.
    intros.
    unfold negb in H.
    induction a. inversion H. inversion H.
Qed.

Definition surjective {X:Type} (f : nat → X) : Prop := ∀ y, ∃ x, f x = y.

Theorem cantor : ¬ ∃ f : nat → nat → bool, surjective f.
Proof.
    intros [f SURJ].
    pose (g := fun b ⇒ negb b ).
    pose (h := fun x ⇒ g (f x x)).
    destruct (SURJ h) as [x B].
    assert (C: h x = f x x).
    {
        rewrite B. reflexivity.
    }
    unfold h in C.
    unfold g in C.
    apply negb_prop in C.
    assumption.
Qed.

End Cantor.
```