1 Exercise 3.1.5

Suppose a and b are real numbers. Prove that if $a < b < 0$ then $a^2 > b^2$.
So we want to prove that $(a < b < 0) \to (a^2 > b^2)$

First we assume the antecedent and make the consequent our goal to prove.

Givens	Goals
$a < b < 0$	$a^2 > b^2$

Suppose $a < b < 0$
    [proof of $a^2 > b^2$]
So if $a < b < 0$ then $a^2 > b^2$

If we multiply the inequality $a < b$ on both sides by the negative number b we have $ab > b^2$ and multiplying $a < b$ on both sides by the negative number a we have $a^2 > ab$. Therefore $a^2 > ab > b^2$ and we have proven our goal and now we can write our proof.

Theorem. *Suppose a and b are real numbers. Prove that if $a < b < 0$ then $a^2 > b^2$.*

Proof. Suppose $a < b < 0$. Multiplying the inequality $a < b$ by the negative number a we can conclude $a^2 > ab$, and, similarly, multiplying $a < b$ by the negative number b we get $ab > b^2$. Therefore, $a^2 > ab > b^2$ and $a^2 > b^2$. Thus, if $a < b < 0$ then $a^2 > b^2$. $\square$

2 Exercise 3.1.6

Suppose a and b are real numbers. Prove that if $0 < a < b$ then $1/b < 1/a$.