

Prove the following statement. Specify your proof method.

If  $r$  is a rational number, and  $x$  is an irrational number, then  $x + r$  is an irrational number.

**Solution:** We prove the contrapositive. We assume  $x + r$  is rational. We need to prove that  $r$  is irrational or  $x$  is rational. If  $r$  is irrational we are done. Otherwise,  $r$  must be rational. Then  $x = (x + r) - r$  is the difference of two rational numbers so it is also rational.