III.3. Prove or disprove that for any irrational numbers $r$ and $s$ their product $rs$ is also irrational.

## **Counterexample:**

Let the two irrational numbers $r$ $and$ $s$ both be $\sqrt{2}$

$$rs = (\sqrt{2})(\sqrt{2}) = 2$$

a contradiction

Both numbers are irrational, but their product is 2, which is a rational number.

So, it is not true that the product of any two irrational numbers must be an irrational. ∎