

1. Prove that $\sqrt[3]{2}$ is irrational.

Recall that the statement $P \iff Q$ means that $P \implies Q$ and $Q \implies P$. Consequently, in order to prove $P \iff Q$, you must prove both that $P \implies Q$ and $Q \implies P$. This really means doing two proofs, either of which might use any of the methods of proof we've covered so far.

2. Let $a \in \mathbb{Z}$. Prove that a is odd if and only if a^3 is odd.

3. Let $a \in \mathbb{Z}$. Prove that $6|a$ if and only if $2|a$ and $3|a$.