

Proofs

①

Exercise let m be an integer. Show that
if $3m$ is even then m is even

① Identify the problem

I want to prove an implication $p \rightarrow q$
is true

p : $3m$ is even

q : m is even

② Define the method of proof

Direct proof: Premise is $\checkmark$ p is true

③ Body of proof

p is true: there exists an integer k such
that $3m = 2k$

$$3m = m + 2m$$

$$m + 2m = 2k$$

$$m = 2(k-m)$$

Since $k-m$ is an integer, m is even: q is true.

④ Conclusion

By direct proof, I have shown $p \rightarrow q$ is true.