

Proof of 3 \implies 1.

- Let us denote

$$B = \{b_1, \dots, b_n\}.$$

- Consider the set

$$\{g(b_1), g(b_2), \dots, g(b_n)\}.$$

- Since g is surjective, every element of A is in this set, and therefore $|A| \leq n$.

