Proof of $1 \implies 3$.

- Let us write

$$A = \{a_1, a_2, \ldots, a_m\}, \quad B = \{b_1, b_2, \ldots, b_n\}.$$

- We are assuming that $m \leq n$.
- Let us define $g(b_1) = a_1, g(b_2) = a_2, \ldots, g(b_m) = a_m$.
- Then send the rest of the b's wherever you want.
- Then g is surjective.

$\square$