$f: A \to B$ is a surjective function
define a relation on A by
$a_0 \sim a_1$ if $f(a_0) = f(a_1)$

- Show that it is an equivalence relation

for $a \in A$ $f(a) = f(a)$ so $a \sim a$
if $f(a_1) = f(a_2)$ then $f(a_2) = f(a_1)$
so $a_1 \sim a_2 \to a_2 \sim a_1$
if $a_1 \sim a_2$ and $a_2 \sim a_3$ then
$f(a_1) = f(a_2) = f(a_3)$ so $a_1 \sim a_3$

- let A^* be the set of equivalence classes Show there is a bijective correspondance between A^* and B.

$[a] \in A^*$ s.t $[a] = \{\tilde{a} \in A, \tilde{a} \sim a\}$
$\tilde{f}([a]) = f(a)$, Since f is surjective
We know that for each $b \in B$ $\exists$ at least one $a \in A$ s.t $f(a) = b$
let $g: B \to A^*$ s.t $g(f(a)) = [a]$
then $g(\tilde{f}([a])) = [a]$ for all $[a] \in A^*$ and
$\tilde{f}(g(b)) = \tilde{f}(g(f(a))) = \tilde{f}([a]) = f(a) = b$ $\forall b \in B$ hence bijective