MATH 113: DISCRETE STRUCTURES
HOMEWORK DUE WEDNESDAY WEEK 3

Problem 1. Let A be a nonempty finite set, let $E \subseteq 2^A$ be the collection of subsets of A of even cardinality, and let $O \subseteq 2^A$ be the collection of subsets of A of odd cardinality. Create an explicit bijective function $f\colon E \to O$ and conclude that $|E| = |O| = 2^{|A|-1}$. (You should define f by giving an explicit procedure one can perform to turn an element of E into an element of O. You should prove that f is bijective either by exhibiting a two-sided inverse, or by proving that f is injective and surjective.)

Problem 2. Let $f\colon A \to B$ be a function. Show that a function $g : B \to A$ such that $f \circ g = \mathrm{id}_B$ exists if and only if f is surjective.