Homework 1

Due Tuesday, September 1, 11:59 PM

Proof

Let A be an arbitrary set.

(a) Exhibit a bijection between $\mathcal{P}(A)$ and the set of all functions from A to the two-element set $\{0, 1\}$.

(b) Prove that there is no bijection between A and $\mathcal{P}(A)$. (Hint: Suppose there is a bijection ϕ from the set A to the set of all functions from A to $\{0, 1\}$. Define $\beta : A \to \{0, 1\}$ to be the function such that $\beta(a) \neq (\phi(a))\,(a)$. What does this say about ϕ?)

Canvas True/False Questions:

(Submit your answers via Canvas.)

- S^0 consists of exactly two points.
- S^1 is a circle.
- S^2 is a sphere.
- S^3 consists of exactly two points.
- The n-simplex Δ^n is defined to be a subset of $\mathbb{R}^{n+1}$.
- The number $x_1^2 + x_2^2 + x_3^2$ is equal to the distance of the point (x_1, x_2, x_3) from the origin of $\mathbb{R}^3$.