Math 61, Lec 1
Winter 2016
Quiz 2
Week 3

Name (Print): Frank Fu

Name (Sign): Frank Fu

Discussion Section: 1D

Let X be a set. We define the *power set* $\mathcal{P}(X)$ to be the set of all subsets of X. For example, if $X = \{1, 2\}$, then $\mathcal{P}(X) = \{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$.

Consider the set $Y = \{1, 2, 3\}$. Define a function $f : \mathcal{P}(Y) \to \mathbb{Z}$ (integers) by $f(S) = \sum_{x \in S} x$.

(For example, $f(\{1, 3\}) = 1 + 3 = 4$.)

Prove that f is not one-to-one. f is one-to-one if for $x_1 \in X$ and $x_2 \in X$ $[f(x_1) = f(x_2)] \Rightarrow x_1 = x_2$

Consider $f(\{3\})$ and $f(\{1,2\})$. [$\{3\}$ and $\{1,2\}$ are both part of $P(Y)$]

Then, $f(\{3\}) = 3$ and $f(\{1,2\}) = 1+2 = 3$.

So, $f(\{3\}) = f(\{1,2\}) = 3$.

However, $\{3\} \neq \{1,2\}$ (a contradiction to the definition of 1-to-1)

$\therefore$ f is not one-to-one. ▨

2/2