Tutorial Worksheet 9

1) For each of the following sets, decide wether it is finite, countable, or uncountable. Explain your answer.

$P(\mathbb{N})$

$\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \cdots\} \cap [0.03, 1]$

$\mathbb{Q}$

$(0, \infty)$

$P(\mathbb{Z})$

$(2, 3)$

All prime numbers

$\mathbb{N} \cap (-\infty, 1000)$

2) Fill the blanks (—) with $\in$ or $\subseteq$. The set $A = \{1, 2, \{1, 2\}\}$.

$\emptyset$ — $\mathbb{Z}$

$\{\{1\}\}$ — $P(A)$

$\{1, \{1, 2\}\}$ — $P(A)$

$\{1, 2\}$ — $P(A)$

$\{\{1, 2\}\}$ — $P(A)$

$\mathbb{N}$ — $P(\mathbb{Z})$

$P(\mathbb{N})$ — $P(\mathbb{Z})$

3) Let $f : \mathbb{N} \to P(\mathbb{N})$ be given by $f(n) = \{n + 1, n + 2, n + 3, \cdots\}$.

(a) Find the set $f(3) \cap [-8, 8]$.

(b) Is f an injection? Explain.
(c) Is f a surjection? Explain.