COSC 341 – Tutorial 3

1. Show that the set of even natural numbers is countable.

2. Show that the set of even integers is countable.

3. Show that the set $\{f | f : \mathbb{N} \to \mathbb{N}\}$ of all functions from $\mathbb{N}$ to $\mathbb{N}$ is uncountable.

Homework

1. Show that the set of total functions from $\mathbb{N}$ to $\{0, 1\}$ is uncountable.

2. We can define the set $\mathbb{N}$ of natural numbers as:

$$0 \in \mathbb{N}$$
$$\text{If } n \in \mathbb{N}, \text{ then } n + 1 \in \mathbb{N}$$

We call this a *recursive* definition.
Give recursive definitions of:

   (a) The set of even natural numbers $EN = \{2n | n \in \mathbb{N}\}$

   (b) The set $P = \{1, 2, 4, 8, 16, \ldots\}$ of powers of 2 within $\mathbb{N}$