TMA1201 Tutorial 04 -
T2 Set theory

1. True or False?
   a) $0 \in \varnothing$
   b) $\{\varnothing\} \in \{\varnothing\}$
   c) $\varnothing \subset \{\varnothing\}$
   d) $\{\varnothing\} \subseteq \{\varnothing\}$
   e) $\{\varnothing\} \in \{\{\varnothing\}\}$
   f) $\{\{\varnothing\}\} \subseteq \{\varnothing, \{\varnothing\}\}$
   g) $\varnothing \in \{x\}$
   h) $\varnothing \subseteq \{\varnothing, x\}$

2. True or False? Determine whether each of the following sets is a power set of a set.
   a) $\varnothing$
   b) $\{\varnothing, \{a\}\}$
   c) $\{\varnothing, \{a\}, \{\varnothing, a\}\}$
   d) $\{\varnothing, \{\varnothing\}\}$
   e) $\{\varnothing, \{a\}, \{b\}, \{a, b\}\}$

3. Find the cardinality of each of the following sets.
   a) $\{x, \{x\}\}$
   b) $\{a, \{a\}, \{a,\{a\}\}\}$
   c) $P(\{a, \{a, \{a\}\}\})$
   d) $P(\{\varnothing\})$

4. Given $A = \{x \in \mathbf{N} \mid (x \text{ is divisible by } 3) \wedge (x < 50)\}$ and $B = \{x \in \mathbf{Z} \mid x \text{ is the square of an integer} \wedge (x < 100)\}$. Find:
   a) $A \cup B$
   b) $A \cap B$
   c) $A - B$
   d) $A \Delta B$
   e) $|P(A \cap B)|$
   f) $P(A \cap B)$
   g) $|P(P(A \cap B))|$

5. Find the sets A and B if $A - B = \{1, 5, 7, 8\}$, $B - A = \{2, 10\}$, and $A \cap B = \{3, 6, 9\}$.

6. Let $A = \{x \mid x \in Z^+ \wedge x \text{ divides } 24\}$ and $B = \{x \mid x \text{ is a prime number} \wedge x < 14\}$
   a) List down all the elements in set A and B.
   b) Find $B \Delta A$.
   c) Find $B - A$
   d) Find $P(B\text{-}A)$