**Solutions to HW 1.**

1. Define $V_0 = \emptyset$, $V_1 = \mathcal{P}(V_0)$, $V_2 = \mathcal{P}(V_1)$, $V_3 = \mathcal{P}(V_2)$, and so on.
   (a) List the elements of $V_0, V_1, V_2$ and $V_3$.

   (b) Draw a directed graph whose "dots" are the sets in $V_3$ and where $x \to y$ means $x \in y$. (Hint: your graph should have four "dots" and four edges.)

2. Find sets $A$ and $B$ satisfying the given conditions.
   (a) $A \in B$ and $A \not\subseteq B$.

   (b) $A \in B$ and $A \subseteq B$.

   (c) $A \notin B$ and $A \subseteq B$.

3. Show that $\bigcup \mathcal{P}(x) = x$.