Read the whole handout §5.0 Set Theory Transition. Then do the below problems.

►. Let the universal set U be $\mathbb{N}$. An index set I will be $\mathbb{N}$ or a subset of $\mathbb{N}$. For each $n \in I$, let

$$A_n = \{k \in \mathbb{N} \colon k \geq n\}.$$

Find the sets listed below the dotted line. Your solutions should be either: $\emptyset$, $\mathbb{N}$, or expressed using the roster method. Do NOT express using set builder notation. No justification needed.

Hint. In this problem, $\mathbb{N}$ is playing *double duties*: $U = \mathbb{N}$ and $I \subseteq \mathbb{N}$.

Hint. In *Thinking Land*, draw a pictorial representation for A_1, A_2, A_3, A_{17}, and for some arbitrary A_n's.

Hint. If you do not know what the roster method is, look it up on handout §2.3 Open Sentences and Sets.

Hint. Latex Help. See through here for empty set $\emptyset$.

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1. The index set $I = \{5, 6, 7\}$. So we are taking the union of three sets.

$$\bigcup_{i=5}^{7} A_i = \textit{cut this out and put your solution here}$$

2. The index set $I = \{3, 4, 5, 6, 7\}$.

$$\bigcup_{i=3}^{7} A_i =$$

3. The index set $I = \mathbb{N} \overset{\text{i.e.}}{=} \{1, 2, 3, 4, \ldots\}$.

$$\bigcup_{i \in \mathbb{N}} A_i =$$

4. The index set $I = \{1, 2, 3\}$. So we are taking the intersection of three sets.

$$\bigcap_{i=1}^{3} A_i =$$

5. The index set $I = \mathbb{N}$.

$$\bigcap_{i \in \mathbb{N}} A_i =$$