

Let  $I = \mathbb{N}$ , and  $A_i = \left\{ x \in \mathbb{R} \mid 1 - \frac{1}{i} \leq x \leq 1 + \frac{1}{i} \right\}$

1. **[4 points]** Write out  $A_1$ ,  $A_2$  and  $A_3$ .
  
  
  
  
  
  
  
  
  
  
2. **[8 points]** Find an expression for  $\bigcup_{i \in I} A_i$  and prove that it is equal to the union.
  
  
  
  
  
  
  
  
  
  
3. **[8 points]** Find an expression for  $\bigcap_{i \in I} A_i$  and prove that it is equal to the intersection.