Examlet 2a **Foundations of Advanced Math** **3/10/21**

1. Let $A = \{1, 2\}$ and $B = \{2, 3\}$. Express each as simply as possible:

   (a) $A \cup B$

   (b) $A \cap B$

   (c) $A - B$

   (d) $\mathcal{P}(A)$

   (e) $A \times B$

2. Biff says that each of the unions below is equal to $\mathbb{R}$. For each, either briefly support or refute his assertion.

   (a) $\bigcup_{a\in\mathbb{Z}}(a, a+1)$

   (b) $\bigcup_{a\in\mathbb{Z}}[a, a+1)$

   (c) $\bigcup_{a\in\mathbb{Z}}\{a, a+1\}$

   (d) $\bigcup_{a\in\mathbb{R}}\{a, a+1\}$

   (e) $\bigcup_{a\in\mathbb{Z}}(a, a+3)$

3.

$$A \cup \bigcap_{i \in I} B_i = \bigcap_{i \in I} (A \cup B_i)$$

4. Show that if $a, b, c \in \mathbb{R}$ with $a < b$ and $c < 0$, then $ac > bc$. Give explicit justifications for each of your steps.

5. $\forall x, y, z \in \mathbb{R}, |x + y + z| \leq |x| + |y| + |z|$.