Exercise 04 - Sets

Create a text file named '`exercises04.txt`' that contains the solutions to each problem below.

1. List the elements of each of the following sets
   a) $\mathbf{A} = \{x : \exists\, n \in \mathbb{N}, x = 5n \wedge x \leq 50\}$
   b) $\mathbf{B} = \{x : x \in \mathbb{N} \wedge x \leq 20 \wedge \forall\, m, n \in \mathbb{N} - \{x\}, x \neq mn\}$
2. Given $\mathbf{A}, \mathbf{B} \subseteq \mathbf{S}$ such that $\mathbf{S} = \{1, 2, 3, 4, 5\}$m $\mathbf{A} = \{1, 2, 3\}$ and $\mathbf{B} = \{3, 4, 5\}$, find
   a) $\mathbf{A} \cup \mathbf{B}$
   b) $\mathbf{A} \cap \mathbf{B}$
   c) $\mathbf{A} - \mathbf{B}$
   d) $\mathbf{B}'$
   e) $\mathbf{B} - \mathbf{A}'$
3. Given $\mathbf{A} = \{a, b, c, d\}$ and $\mathbf{B} = \{i, j, k\}$, find $\mathbf{A} \times \mathbf{B}$ and $\mathbf{B} \times \mathbf{A}$.
4. Given $\mathbf{C} = \{a, b, c, d\}$, find $\wp(\mathbf{C})$ and $\left|\wp(\mathbf{C})\right|$.
5. Given $\mathbf{S} = \{x : x \in \mathbb{N}, x \leq 100\}$, partition $\mathbf{S}$ over the relation $R(a, b) \Rightarrow 10 \mid (a - b)$ where $x \mid y$ implies $y = kx$ where $k \in \mathbb{Z}$