

Four of these problems will be graded (my choice, not yours!), with each problem worth 5 points. Clear and complete justification is required for full credit. You are welcome to discuss these problems with anyone and everyone, but must write up your own final submission without reference to any sources other than the textbook and instructor. Submit as a pdf on Moodle.

1. For each $x \in \mathbb{R}$, let $R_x = (x, x + 2]$. What are:

(a) $\bigcup_{x \in \{1,2,3\}} R_x$

(b) $\bigcap_{x \in \{1,2,3\}} R_x$

(c) $\bigcup_{x \in \mathbb{N}} R_x$

(d) $\bigcap_{x \in \mathbb{N}} R_x$

(e) $\bigcap_{x \in \mathbb{Z}} R_x$

2. For each $x \in \mathbb{R}$, let $S_x = (x, \infty)$. What are:

(a) $\bigcup_{x \in \{1,2,3\}} S_x$

(b) $\bigcap_{x \in \{1,2,3\}} S_x$

(c) $\bigcup_{x \in \mathbb{N}} S_x$

(d) $\bigcap_{x \in \mathbb{N}} S_x$

(e) $\bigcap_{x \in \mathbb{Z}} S_x$

3. Suppose that $a, b \in \mathbb{R}$, with $a < b$ and $a, b > 0$. Then $\forall n \in \mathbb{N}, a^n \leq b^n$.

4. Prove Lemma 1 from §2.6.

5. Prove Lemma 2 from §2.6.

6. For all $x, y, z \in \mathbb{R}$, $|x + y + z| \leq |x| + |y| + |z|$.

7. For all $x, y \in \mathbb{R}$, $d(x, y) = d(y, x)$.

8. Do the CrossProducts assignment on WeBWorK.