MATH310 Homework 2022-07-20
Due Gradescope 11:59pm 2022-07-22

1. Explicitly list the elements using non-conditional set notation in each of the following sets. You may or may not need ellipses.

   (a) $\{2n \,\big|\, n \in \mathbb{Z}\}$ [5 pts]

   (b) $\{-n \,\big|\, n \in \mathbb{N}\}$ [5 pts]

   (c) $\{5 - n/2 \,\big|\, n \in \mathbb{Z} \text{ and } n > 7\}$ [5 pts]

2. Determine if each of the following elements is in each set. Use $\in$ or $\notin$.

   (a) Is 3 an element of $\{2x + 11 \,\big|\, x \in \mathbb{Z}\}$? [5 pts]

   (b) Is $\mathbb{Z}$ an element of $\mathbb{Z}$? [5 pts]

   (c) Is $\emptyset$ an element of $\{\{\}, \{\{\}\}\}$? [5 pts]

   (d) Is 5 an element of $\mathbb{Q}$? [5 pts]

   (e) Is 5 an element of $\mathbb{C} - \mathbb{R}$? [5 pts]

3. List all the elements in $\mathcal{P}(\{\emptyset, \mathcal{P}(\{1\})\})$ [10 pts]

4. Prove that: [25 pts]
$$\left\{x \in \mathbb{R} \,\middle|\, |x - 4| < x\right\} = (2, \infty)$$

5. For all sets A and B, prove that $A = B$ iff $\mathcal{P}(A) = \mathcal{P}(B)$. [25 pts]