MATH310 Homework 2022-08-12
Due Gradescope 11:59pm 2022-08-16

1. Prove that $2\mathbb{Z} \approx 3\mathbb{Z}$. [20 pts]

2. In class we proved that $(0,1) \approx \mathbb{R}$ using a fancy picture. Give another proof using a modification of a familiar trig function. [20 pts]

3. Prove that the following set is denumerable: [20 pts]

$$\left\{ ..., \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1, 2, 4, 8, ... \right\}$$

4. In class we prove that $\mathbb{Q}^+$ is countable. Use this fact to prove that $\mathbb{Q}$ is countable. [20 pts]

5. Prove that: [20 pts]
$$(0,1) \times (0,1) \approx \mathbb{R}^2$$