

Homework Set 1

DUE: SEP 13, 2021 (VIA BLACKBOARD, BY 11.59PM)

To be handed in:*Please remember that all problems will be graded!*

1. [Ross, Exercise 1.5] Prove (by induction) that, for any $n \in \mathbb{N}$,

$$1 + \frac{1}{2} + \frac{1}{4} + \cdots + \frac{1}{2^n} = 2 - \frac{1}{2^n}$$

2. Prove that $\sqrt{23}$ is not a rational number.

3. Is $\sqrt{18 + 2\sqrt{17}} - \sqrt{17}$ a rational number or not? Justify.

Hint: Don't jump to any conclusions too fast here.

Note that $(\sqrt{18 + 2\sqrt{17}})^2 = 18 + 2\sqrt{17} = 17 + 2\sqrt{17} + 1 = \dots$