

CSC263 Worksheet 1 Solution

Hyungmo Gu

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Question 1

a. *Proof.* Assume the statement $P(115)$ is true. That is, $\sum_{i=0}^{i=115} 2^i = 2^{115+1}$.

We need to prove $\sum_{i=0}^{i=116} 2^i = 2^{116+1}$.

Starting from the left, we can write

$$\sum_{i=0}^{i=116} 2^i = \sum_{i=0}^{i=115} 2^i + 2 \quad (1)$$

Then, using the assumption $\sum_{i=0}^{i=115} 2^i = 2^{115+1}$, we can conclude

$$\sum_{i=0}^{i=116} 2^i = 2^{115+1} + 2^{116} \quad (2)$$

$$= 2^{116} + 2^{116} \quad (3)$$

$$= 2^{116}(1 + 1) \quad (4)$$

$$= 2 \cdot 2^{116} \quad (5)$$

$$= 2^{116+1} \quad (6)$$

□

Question 2

Question 3

Question 4