

Midterm 2 Version 1 Solution

April 3, 2020

Question 1

1.

$$100 \div 2 = 50, \text{Remainders } 0$$

$$50 \div 2 = 25, \text{Remainders } 0$$

$$25 \div 2 = 12, \text{Remainders } 1$$

$$12 \div 2 = 6, \text{Remainders } 0$$

$$6 \div 2 = 3, \text{Remainders } 0$$

$$3 \div 2 = 1, \text{Remainders } 1$$

$$1 \div 2 = 0, \text{Remainders } 1$$

Then, it follows from above that the binary representation of 100 is $(1100100)_2$.

2. The smallest number that can be expressed by an n-digit balanced ternary representation is

$$\sum_{i=0}^{n-1} d_i \cdot 3^i, \text{ where } d_i \in \{0, 1, 2\} \quad (1)$$

Correct Solution:

The smallest number that can be expressed by an n-digit balanced ternary representation is

$$- \left[\sum_{i=0}^{n-1} 3^i \right] \quad (2)$$

Notes:

- Realized professor is asking for an example of the smallest number.
- Learned a negative number could be expressed in in ternary or binary representation of numbers.

Question 2

Question 3

Question 4