

Midterm 2 Version 2 Solution

Hyungmo Gu

April 4, 2020

Question 1

a.

$100 \div 3 = 33$, Remainder **1**

$33 \div 3 = 11$, Remainder **0**

$11 \div 3 = 3$, Remainder **2**

$3 \div 3 = 1$, Remainder **0**

$1 \div 3 = 0$, Remainder **1**

It follows from above that the ternary representation of 100 is $(10201)_3$.

b. The largest number expressible by an n -digit binary representation is

$$\sum_{i=0}^{n-1} 2^i \tag{1}$$

Correct Solution:

$$\sum_{i=0}^{n-1} 2^i = \frac{1 - 2^{n-1+1}}{1 - 2} = 2^n - 1 \tag{1}$$

c.	$f(n) \in \mathcal{O}(n)$	True	$g(n) \in \Omega(n)$	False	$f(n) \in \Omega(g(n))$	True
	$f(n) \in \Theta(g(n))$	False	$g(n) \in \Theta(\log_3 n)$	False	$f(n) + g(n) \in \Theta(f(n))$	True

Notes:

- Learned \sqrt{n} rises faster than $\log n$.
- Learned if $g(n) \in \Theta(f(n))$ is true then $f(n) + g(n) \in \Theta(f(n))$ is true.

Question 2

Question 3

Question 4