Midterm 2 Version 2 Solution

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Question 1

a.

$$\begin{aligned} 100 \div 3 = 33, \text{Remainder } \mathbf{1} \\ 33 \div 3 = 11, \text{Remainder } \mathbf{0} \\ 11 \div 3 = 3, \text{Remainder } \mathbf{2} \\ 3 \div 3 = 1, \text{Remainder } \mathbf{0} \\ 1 \div 3 = 0, \text{Remainder } \mathbf{1} \end{aligned}$$

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

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

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