

SchoolNova, Math 5c
Homework 12
More Binary and Base-4 Numbers
January 14, 2018

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a *. If unable to solve a problem, please present your thoughts and any partial solution.

1. Perform the following binary additions:

(a) $1111 + 111$ (b) $1111 + 1$ (c) $11011 + 10$ (d) $100 + 101$

2. Perform the following subtractions in binary notation:

(a) $30 - 3$ (b) $32 - 1$ (c) $42 - 15$ (d) $60 - 20$

3. Add the following base-4 numbers together:

(a) $222 + 1$ (b) $333 + 1$ (c) $300 + 200$ (d) $300 + 300$

4. Find the sum of the bits of the binary representation of $2^m - 2^n$, where m and n are integers and $m > n > 0$.

5. * Let $T(n)$ be the binary number of n 1's, for example:

$T(3) = 111$ $T(5) = 11111$.

(a) When is $T(n)$ divisible by 5?

(b) When is $T(n)$ divisible by 7?

6. Find the prime factorization of the following number: $99^2 - 9^2$.

7. * The notation $a|b$ means a divides b , with a remainder 0. Show that if $a|b$ and $b|c$, then $a|c$.

8. See the attached Excel file with the Sudoku puzzle.