COMP 102A 2014, Assignment 1
Due Monday September 29th 2014

[16%] 1. **Binary vs Decimal**

Give the binary representation for each decimal number below :

1234 65537 1001001 1024

Give the decimal representation for each binary number below :

10000 1111111 1001001 1000

[16%] 2. **Ternary representation**

Write two algorithms similar to those explained in class : one to convert ternary numbers to an integer and one to convert an integer to a ternary number.

The ternary representation of an integer is a sequence $T_nT_{n-1}...T_0$ where each $T_i \in \{0,1,2\}$, $T_n>0$. The integer associated to the sequence is $\Sigma_i T_i \times 3^i$.

[16%] 3. **Standard Binary formats**

Give the floating point representation (32 bits) for each decimal number below :

0.25 0 1001001 -0.75

Give the signed integer representation (32 bits) for each decimal number below :

0 -535 -1024 -100000

4. Slow delivery…

[16%] Estimate the amount of time necessary to upload an audio CD over a (V.92) telephone modem.

If you buy an 8 GB iPod nano and you store in it music compressed in MP3 format. How much listening time can you expect if your MP3 format reduces the data size by a factor of 5 (compared to AIFF format).

5. Logical

[16%] Demonstrate (using truth tables) that for all boolean values we have :

X OR Y = NOT (NOT X AND NOT Y)

X XOR Y =
(X OR Y) AND NOT (X AND Y)

6. Binary Subtraction

[20%] Use the basics bit operations to define the subtraction of two n-bit integers, assuming the latter is smaller than former. (your answer should look like the set of rules for binary addition)