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 111111 1001001 1000

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 $T_i \in \{0,1,2\}$, $T_n \neq 0$. The integer associated to the sequence is $\sum_i T_i \times 3^i$.

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…**

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**

Demonstrate (using truth tables) that for all boolean values we have:

\[ X \text{ OR } Y = \text{NOT (NOT } X \text{ AND NOT } Y) \]

\[ X \text{ XOR } Y = (X \text{ OR } Y) \text{ AND NOT (X AND Y)} \]

6. **Binary Subtraction**

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)