Fatih Yildiz

Q2.2) 5 trits for exponent, and 13 trits of mantissa is enough to represent values with high presicion and wide range. In order to achieve the same decimal digit presicion as in the binary floating point representation, I used 13 trits for the mantissa.

binary $\Rightarrow 23 \cdot \log_{10} 2 \approx 23.0{,}3 \approx 6$ dec. digits presicion

ternary $\Rightarrow 13 \cdot \log_{10} 3 \approx 13 \cdot 0{,}47 \approx 6$

In order to cover the whole range of numbers (and a bit more than that) represented by the single presicion binary floating point representation, we need at least 5 exponent trits. As I further explained in part 2.4 we calculate our number with formula $X = 0{,}m \cdot 3^e$. Focusing on the maximum positive number we represent, $X = 0{,}5 \cdot 3^e$. In order to cover the binary f.p representation's range, e must be greater than 81 $\left(0.5 \cdot 3^{81} < \underbrace{2 \cdot 2^{127}}_{\text{max number in binary floating point repr.}} < 0{,}5 \cdot 3^{82}\right)$

Thus we need at least 5 trits to cover this range. Moreover, since we have 5 trits for the exponent, we can use it to represent very small values (around 0) by setting it to e=----- (all negative ones).