I. Prove the following equality. For 2’s complement representation \( (x_{k-1}, x_{k-2}, \ldots, x_1, x_0) \), the value is 
\[-x_{k-1}2^{k-1} + \sum_{i=0}^{k-2} x_i2^i.
\]

II. Convert \((3|2|1)_{\text{RNS}(7|5|3)}\) to mixed-radix representation \((z_2|z_1|z_0)_{\text{MRS}}\).
III. Convert $(1|2|2)_{RNS(7|6|5)}$ to decimal.

IV. Use $4 \times 5$ in 3-bit binary representation to demonstrate radix-4 multiplication with Booth recoding scheme.
V. What are the key concepts of radix-4 SRT (Sweeney, Robertson, and Tocher) division? What is the range (big O) of the delay of the hardware if the dividend has $2n$ bits and the divisor has $n$ bits? Explain your solution.