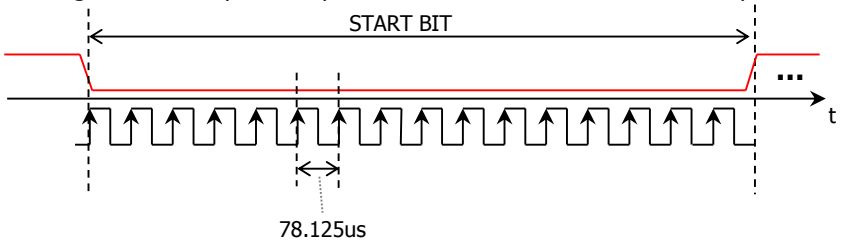
Quiz 4

(November 25th @ 5:30 pm)

PROBLEM 1 (20 PTS)

- HCS12D – SCI1: The figure below depicts the process of detection of a Start Bit. Complete the table. E-clock = 24 MHz.



Baud Rate = Tx clock frequency (Hz)	**Rx clock frequency** (Hz)	**SCI1BDH**	**SCI1BDL**

PROBLEM 2 (50 PTS)

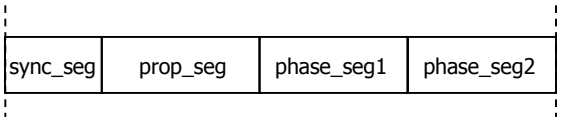
- Analog to Digital Conversion: Using the successive approximation algorithm, compute the $n-bit$ codes and their corresponding quantized voltages V_k for the input voltage Vin = 1.80v. V_{DD} = 5v.
  Formula for Quantized voltage: $V_k = \left(\frac{k}{2^n}\right) V_{DD}$

Vin =1.80v	**n-bit code**	**V_k (v)**
n = 4		
n = 5		

- If we want the maximum quantization error to be lower than 0.01v, what is the minimum number of bits that achieves this?

PROBLEM 3 (30 PTS)

Given the following CAN system requirements, calculate: i) Time Quantum, ii) CAN Bit Time (in units of time and in time quanta), and iii) Time segments (in time quanta).



E-clock= 24 MHz Bit rate = 200 kbps
Bus length = 40 m Bus propagation delay = $4 \times 10^{-9}\, s/m$
Transmitter (MCP2551 Transceiver) plus receiver propagation delay = 150 ns at 85 ºC