Georgia Tech

COLLEGE OF ENGINEERING
SCHOOL OF AEROSPACE ENGINEERING

AE 6705: INTRODUCTION TO MECHATRONICS

LAB3

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Question 1

Solution:
The bit per second for this Baud rate is

$$1/38400 = 2.604 \times 10^{-5} \quad \text{bit/sec}$$

Let the 2 devices are off by x seconds, then at the last bit they will be off by $9x$ seconds. Thus, it can be off by

$$x = \frac{2.904 \times 10^{-5}}{2 \cdot 9} \approx 1.45 \times 10^{-6} \quad \text{sec} = 1.45 \quad \mu s$$

If a baud rate (b) mismatch of 5% is acceptable the range would be

$$\frac{1}{18(1.05b)} \leq x_{allow} \leq \frac{1}{18(0.95)b}$$
$$1.38 \quad \mu s \leq x_{allow} \leq 1.52 \quad \mu s.$$

Hence, compared to the 5% approximation the value we have computed is an acceptable clock rate error between the 2 devices.

Question 2

Solution:
The error expected to see is the framing error which will be triggered by the receive error flag UCRXERR which is the second bit of the UCAxSTATW register. This flag is triggered automatically whenever there is more than one error flag: framing error, receive overrun error, parity error, and break condition error. Thus, in the case of a framing error the receive error flag will indicate the error.

Question 3

Solution:
A possible solution is to lower the baud rate. This will solve the framing error, but with the expense of lowering the data transmission rate. Hence, the performance speed will decline.