

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
COLLEGE OF COMPUTER SCIENCES & ENGINEERING
COMPUTER ENGINEERING DEPARTMENT
COE-341 – Data and Computer Communication
Matlab Programming Assignment #1: Cyclic Redundancy Check
(CRC) – Due Date May 31st, 2010 – In Class.

[100 points] It is desired to write a code in Matlab to perform the CRC calculation as per the hardware structure (shift register implementation) shown in textbook Figure 6.6. The code should accept an arbitrary pattern polynomial ($P(x)$) of length $n+1$, an arbitrary data sequence M of length k bits, and compute the corresponding cyclic redundancy check (CRC) of length n bits, R .

The code generates the transmitted frame Tt which is the k bits message with the n bits CRC. Tt is added (mod 2 addition) to the error pattern to produce the received frame Tr which is again divided by $P(x)$ to determine whether the frame is in error or not.

Hint: if you write the division routine as a Matlab “function”, you can use it to first produce the CRC and use it again to divide Tr by the pattern P .

Use the code to verify the CRC calculations shown in the class notes and include the corresponding outputs as examples in your submissions.

The developed Matlab code should be very organized and well documented. Use variable names identical or very close to the mathematical variable used in this problem statement. The documentation should clearly specify the sections of the code that correspond to each part of this programming assignment. Students are encouraged to cooperatively discuss the problem and the Matlab know-how, however, when it comes to writing the code, each student must write and submit his own code. The submitted codes will be inspected for similarities.

Generate the required output and import them into a Microsoft word file (see the sample below). Zip the word file together with the Matlab code and submit the zipped file by email to: g200802800@kfupm.edu.sa (Our TA Eng. Irfan Khan) and ashraf@kfupm.edu.sa (The instructor). The name of the zipped file should be according to the following pattern: sXXXXXX_LastName_FirstName_ProgAssig2.zip. sXXXXXX is the student number.

Students must ALSO submit a hardcopy of the programming assignment solution (i.e. the word file) and the used Matlab code.

Bonus Marks in the Final Exam:

1. One bonus mark: The code tests for ALL possible SINGLE bit errors and determines the fraction of detected errors.
2. Two bonus marks: The code tests for ALL possible SINGLE and DOUBLE bit errors and determines the fraction of detected errors.
3. Three bonus marks: The code tests for ALL possible m -bit errors ($m = 1, 2, 3, \dots, n+k$) and determines the fraction of detected errors.