

**This project deals with the CRC calculation and IP Checksum Calculation**

**Part 1 (5 pts) CRC calculation.** The method for determining the CRC value to append to the message sent was discussed in class. For the method shown in class, extra 0's were added on to the original message before the calculation took place.

For this part of the project, show that by adding 1's instead of 0's results in the same CRC value added to the end of the message. Remember that all math is binary XOR and no bits carry.

The message and generator to use for this project are shown below:

$M(X) = 1010110011100010$

$C(X) = 11011$

You will have to perform 2 calculations to obtain the two messages sent – one calculation is for adding 0's the other for adding 1's

Reference text book chapter 2, problem 20 (hw#2, problem 3) for a more in depth discussion of how CRC's are actually calculated. Part a is a direct application of the above concept

Hint: The first part of the division is the same for the two calculations – only difference comes when you start bringing down the added in 0's or 1's

**Part2 (15 pts) IP checksum calculation.** For this part, perform the IP Checksum (use 16 bit checksum) on the following two IP headers.

The IP header consists of 20 bytes of data. This information is shown as hexadecimal numbers. For example, look at the third grouping in the IP header in part a. This grouping is bfc5 and it is underlined. That grouping is hex digits b, f, c and 5 and in binary those hexadecimal digits are 1011, 1111, 1100 and 1001. The header checksum value is shown in the shaded part of the header. This checksum is calculated from the other parts of the header when a value of 0000 used for the checksum field.

For the two IP headers shown, one of the checksums is correct. The other checksum is incorrect.

Compare your checksum result to the value for the checksum provided in the IP header. Was the header successfully received (do the checksums match)?

Use the example on the link shown to help with this problem:

<http://www.thegeekstuff.com/2012/05/ip-header-checksum/>

This link and a pdf of the page are on the lecture page for the course.

a) IP header to perform IP checksum on:

4500 0034 bfc5 4000 4006 6fba c0a8 4501 c0a8 4502

b) IP header to perform IP checksum on:

4500 004e 39d6 0000 8011 8621 92e5 a4dd 92e5 afff

Note: there is a c program in the text(pg 95) which can be programmed to calculate the checksum – provided you can have it successfully read in the hex digits(will require some extra work)