EELE 475
Homework Assignment #1
Due Tuesday Oct 27, 2015
(You will need this for lab #7)

Create a function that will parse the NMEA codes coming from a GPS unit (as well as computing the checksum) that will be implemented in lab #7 (data will come in on a UART).

The objective is to get the information contained in the GPGGA and GPGSA data set.

```
$GPGGA,21018.00,4539.99762,N,11102.78175,W,1,07,1.14,1518.3,M,-17.6,M,,*52
$GPGSA,A,3,26,27,09,02,28,17,12,,,,,1.87,1.13,1.48*07
```

Characters will be streaming in that looks like the following (there is a CR-LF at the end of each data set).

```
$GPGLL,4539.99781,N,11102.77595,W,210416.00,A,A*4
$GPRMC,210417.00,A,4539.99764,N,11102.77603,W,0.444,,280909,,,A*65
$GPVTG,,T,,M,0.444,N,0.822,K,A*2F
$GPGGA,210417.00,4539.99764,N,11102.77603,W,1,07,1.13,1516.1,M,-17.6,M,,*5C
$GGSA,A,3,26,27,09,02,28,17,12,,,,,1.87,1.13,1.48*07
$GPGSV,4,1,13,02,17,190,18,04,40,169,11,09,47,292,35,11,04,042,*72
$GPGSV,4,2,13,12,16,296,22,14,01,345,,15,03,234,27,17,66,051,24*71
$GPGSV,4,3,13,20,11,069,2,0,323,26,27,53,277,36,28,34,105,19*7F
$GPGSV,4,4,13,32,06,044,21*4F
$GPGLL,4539.99764,N,11102.77603,W,210417.00,A,A*72
$GPRMC,210418.00,A,4539.99756,N,11102.77591,W,0.285,,280909,,,A*68
$GPVTG,,T,,M,0.285,N,0.527,K,A*2C
$GPGGA,210418.00,4539.99756,N,11102.77591,W,1,07,1.13,151.1,M,-17.6,M,,*5A
$GPGSA,A,3,26,27,09,02,28,17,12,,,,,1.87,1.13,1.48*07
$GPGSV,4,1,13,02,17,190,19,04,40,169,08,09,47,292,35,11,04,042,*7B
$GPGSV,4,2,13,12,16,296,22,14,01,345,,15,03,234,27,17,66,051,23*76
$GPGS,43,13,20,11,069,,26,09,323,27,27,53,277,37,28,34,105,19*7F
$GPGSV,4,4,13,32,06,044,22*4C
$GPGLL,4539.99756,N,11102.77591,W,210418.00,A,A*74
```

For this homework, read in the file GPS_characters.txt. **Read in the file a single character at a time** as this is how it will come from a GPS unit Print out the relevant information from the GPGGA and GPGSA packets to the console each time you encounter it. Take a picture of the console window that shows this information. Submit both your commented code and console window shots to the D2L dropbox.

For the GPGGA data set, report latitude, longitude, elevation, and time. For the GPGSA data set, report the satellite ID numbers.

Do not use any function from any standard library in your parsing operation. You need to create all your own parsing functions where data is coming in one character at a time.

Information on how to interpret the GPGGA and GPGSA data sets can be found on page 92 and 94 of GPS_Info.pdf (found on D2L site in this homework directory). You will need to check the checksum for any errors and ignore the dataset if there are errors (there might be errors in the given data sets). Information on how to calculate the checksum can be found on page 98. Information on WGS-84 can be found on page 60. Information on computing the distance between two latitude/longitude points can be found at: http://www.movable-type.co.uk/scripts/latlong-vincenty.html