

C Language Programming: Homework #7
Assigned on 12/23/2014(Tuesday), Due on 12/30/2013(Tuesday)

1. Write a program that read data from a file containing a datum called prefix in each line of the file. Each prefix contains an 128-bit IPv6 address.

2001:0db8/32

2001:db8:85a3/48

3FFE:1300:0004:0002:0000:0000:0000/64 or 3FFE:1300:0004:0002/64

2001:0208:0000:0000:0000:0000:0000/35 or 2001:0208/35

An IPv6 address is represented as eight groups of four **hexadecimal** digits, each group representing 16 **bits** (two **octets**). The groups are separated by **colons** (:). An example of an IPv6 address is:

2001:0db8:85a3:0000:0000:8a2e:0370:7334

Leading zeroes in a group may be omitted. Thus, the example address may be written as:

2001:db8:85a3:0:0:8a2e:370:7334

One or more consecutive groups of zero value may be replaced with a single empty group using two consecutive colons (::).^[1] Thus, the example address can be further simplified:

2001:db8:85a3::8a2e:370:7334

2. The first part is a 128-bit IP address. So, you have to store the IP address into an unsigned variable. For the prefix length, you can use an unsigned character. So, for all the prefixes, you can use two array to store all the prefixes, e.g., IP[N][4] and Len[N], where N is the number of prefixes.
3. please do the the following:
 - (a) write a function *input(..)* to read all the prefixes from the input file
 - (b) compute the total number of prefixes in the input file,
 - (c) write a function *length_distribution(..)* to compute the number of prefixes with prefix length *i*, for *i* = 0 to 128,
 - (d) use *argc* and *argv* to input the input file and output the computed results to an output file, like “hw7 in_file_name out_file_name”