See course website for instructions and due date.

1. These questions are about extendible hashing.

   Consider the extendible hash shown in Figure 11.14 (p. 387) of the Cow Book. For questions that require modifying the index, answer it with respect to the *original* index shown in the figure, as opposed to the index that results from answering any preceding question. In addition, it is not necessary to draw the whole index. Instead, you need only draw the parts of the index that change. Be sure to use labels so it's clear what part you are referring to!)

   (a) Show the index that would result from inserting records with hash values 27 and 39.

   (b) Show the index that would result from deleting records with hash values 16 and 64. (Assume that empty buckets are merged even though this is often not done in practice.)

   (c) Give an example of a sequence of entries that causes the directory to double. Provide the sequence of *minimal* length consisting of *minimal* hash values (assume that keys hash to *non-negative integers* and there are *no duplicate* hash values). What do I mean by minimum hash value? Suppose I wanted to add another record to bucket B. Given that B already contains 1 and 5 and there is an assumption of no duplicates, the minimum hash value that can be placed into bucket B is 9.

   (d) Give an example of a sequence of entries that causes the directory to double. Provide the sequence of *maximal* length consisting of *minimum* hash values. (Same assumptions hold as in previous question.)