binary application to search In the lecture the following procedure was discussed: given a secret number, positive integer, on 8 bits (0:255), one can identify the number with 8 questions by asking a question about each bit. The only questions allowed have two answers Yes and No.

The obvious question to ask for the k-th bit is
`"Is the k-th bit 1?"`
The answer would identify the k-th bit as 1 or 0, and with all 8 questions answered all bits are revealed.

Now suppose these questions are not allowed, but instead only questions allowed are like
`"is the number at least <v>?"`
where $<v>$ can be any value the questioner chooses. It is also allowed to design the next question *dynamically* from the result of the previous questions. So one can ask `"is the number at least 25?"`; if Yes comes back one can ask `"is the number at least 75?"`, but if No comes back one can change the second question to `"is the number at least 10?"`

Exercise. Describe a procedure that assigns the values $<v>$ for each of the eight questions dynamically (using the responses to previous questions) so that with all 8 responses the number is always identified.

Discuss at recitation. For Extra Credit, write up the explanation/solution (1 page max) to this exercise, submit on paper with your name and date on it.

Exercise. Write a program in your favorite language (Python, Perl, Java, Scheme, Matlab, C, etc) that implements this procedure. For Extra Credit, demo it live to a TA.