HOMEWORK ASSIGNMENT NO. 2

DATE: ASSIGNED SEPT 21, 2021 - DUE OCTOBER 5, 2021

Your assignment should include complete sentences and explanations and not just a few equations or numbers. A solution will not receive full credit unless you explain clearly why your answer is correct. It should also explain any notation and terms (language) that you use to refer to the parts of problem in your description. Try to explain the answer briefly with just enough information to ensure that the reader is confident of your solution.

You may discuss the homework with other students in the class, but credit your sources for your answers in a bibliography and write your own solutions. Please reference any sources you borrowed material from (e.g. pictures, formulae, ideas on how to solve the problem, online programs, etc.).

(1) On a digital clock on my wall, each digit of the time is displayed by lighting up to 7 segments, as in the following picture:

The problem is my clock is broken in the display of the last digit. There only the center segment of the display is working properly and instead I see the sequence in the following order for the digits 1 through 9 and 0:

At night when I stare at the clock I can see when a minute advances, but can't tell what minute digit is reading unless it changes from 9 to 0 and the the digit measuring the 10-minute mark changes. How can I tell by watching the pattern of the broken digits what the time is? Specifically, how many times must the digit advance before I am sure of the time?

(2) Consider the same setup in the previous question, but that you are only able to see the minute digit (and not the 10 minute digit). How many times must must you observe the number advance before you determine what the minute digit position is reading?

Remark: When the question asks 'how many times must the digit advance before I am sure of the time?' there are different ways of interpreting this. Make sure that your answer establishes that the answer depends on the time and doesn't just provide an upper limit.