CS544, Homework 3

- **Question 1**

  - **Exercise 13.3.1:**

    - Suppose we are scheduling I/O requests for a disk, and the requests arrives as follows:

Time of arrival	Request for track
0 msec	8,000
1 msec	48,000
10 msec	4,000
20 msec	40,000

      The disk head initially at track 32,000.

      The time it takes the disk head to move n tracks is $1 + 0.00025n$ **msec**.

      The (average) latency and transfer time is total 4.3 msec.

  Questions:

    - At what time is each request serviced fully if we use the **elevator algorithm** (it is permissible to start moving in either direction at first).

      Indicate the **order** in which the **requests** will be **satisfied** !!!

      Answer must be in this form (with dervations !)

      ```
              Request (for track#)         Time of completion
      ------------------------------------------------------------------------
      #1        track #
      #2        track #
      #3        track #
      #4        track #

      Explanation:




      ```
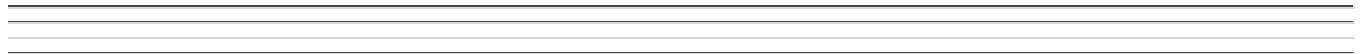
- At what time is each request serviced fully if we use the **first come, first serve** service discipline

  Indicate the **order** in which the **requests** will be **satisfied** !!!

  Answer must be in this form (with dervations !)

  ```
          Request (for track#)        Time of completion
   ---------------------------------------------------------------------

   #1        track #
   #2        track #
   #3        track #
   #4        track #

  Explanation:




  ```

- **Question 2 (Exercise 13.4.6-8)**

  - Suppose we are using a RAID level 4 scheme (using even parity) with four data disks and one redundant disk.

    Aassume that blocks are a single byte.

    Questions:

    - Give the block of the redundant disk if the corresponding blocks of the data disks are:

      1. 01010110, 11000000, 00111011, and 11111011.

         Answer:

      2. 11110000, 11111000, 00111111, and 00000001.

         Answer:

- Suppose that data disk 1 has failed.

  Recover the block of that disk under the following circumstances:

  - The contents of disks 2 through 4 are 01010110, 11000000, and 00111011, while the redundant disk holds 11111011.

    Answer:

  - The contents of disks 2 through 4 are 11110000, 11111000, and 00111111, while the redundant disk holds 00000001.

    Answer:

■ Suppose the block on the first disk in part (1) is changed to 10101010.

What changes to the corresponding blocks on the other disks must be made?

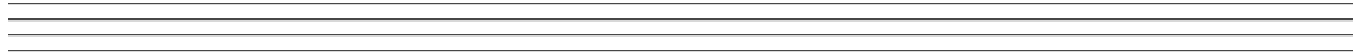1. Originally: 01010110, 11000000, 00111011, and 11111011.

   Changed to: 10101010, 11000000, 00111011, and 11111011.

   Answer:

2. Originally: 11110000, 11111000, 00111111, and 00000001.

   Changed to: 10101010, 11111000, 00111111, and 00000001.

   Answer:

- **Question 3 (Exercise 13.7.1-3)**

  ○ A patient record consists of the following:

  - 3 fixed-length fields: the patient's date of birth, social-security number, and patient ID, each field is 10 bytes long.
  - It also has the following 3 variable-length fields: (1) name, (2) address, and (3) patient history.

  - If pointers within a record require 4 bytes, and the record length is a 4-byte integer, how many bytes, exclusive of the space needed for the variable length fields, are needed for the record ?

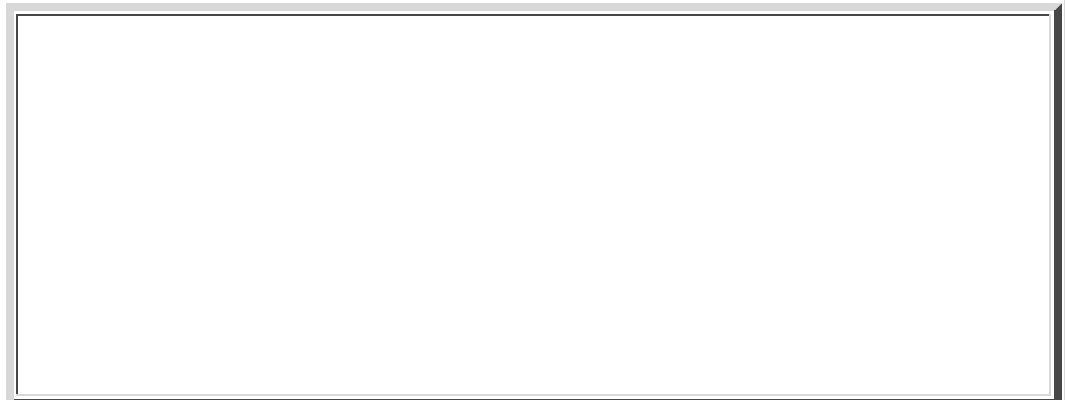   You may assume that no alignment of fields is required.

    Answer:

  ○ A patient record consists of the following:

  - 3 fixed-length fields: the patient's date of birth, social-security number, and patient ID, each field is 10 bytes long.
  - It also has the following 3 variable-length fields: (1) name, (2) address, and (3) patient history.
  - A **repeating field** that represents cholesterol tests --- Each cholesterol test requires 16 bytes

  - Show the layout of patient records if the repeating tests are kept with the record itself.

    Answer:

    (Draw a picture that shows the position of the records and where each pointer is pointing to).