**Problem 1**: A volume:

- BootSector:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
00000000  EB 3C 90 4D 53 44 4F 53  35 2E 30 00 02 02 08 00   ë<ÉMSDOS5.0.....
00000010  02 00 02 E0 3F F8 20 00  20 00 40 00 20 00 00 00   ...à?ø . .@. ...
00000020  00 00 00 00 80 00 29 4A  4A 7E 34 4E 4F 20 4E 41   ....Ç.)JJ~4NO NA
00000030  4D 45 20 20 20 20 46 41  54 31 36 20 20 20 33 C9   ME    FAT16   3É
00000040  8E D1 BC F0 7B 8E D9 B8  00 20 8E C0 FC BD 00 7C   ÄÑ¼ð{ÄÙ¸. ÄÀü½.|
00000050  38 4E 24 7D 24 8B C1 99  E8 3C 01 72 1C 83 EB 3A   8N$}$ÉÁÖè<.r.Éë:
00000060  66 A1 1C 7C 26 66 3B 07  26 8A 57 FC 75 06 80 CA   fí.|&f;.&ÉWüu.ÇÊ
```

- First part of root directory:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
00009000  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009010  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009020  57 49 4E 48 45 58 20 20  43 4E 54 20 18 B3 6C 75   WINHEX  CNT .³lu
00009030  C7 3A C7 3A 00 00 A0 08  61 35 15 00 71 06 00 00   Ç:Ç:.. .a5..q...
00009040  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009050  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009060  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009070  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009080  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00009090  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
000090A0  54 49 4D 45 5A 4F 4E 45  44 41 54 20 18 9A 70 75   TIMEZONEDAT .Öpu
000090B0  C7 3A C7 3A 00 00 A0 08  61 35 03 00 60 09 00 00   Ç:Ç:.. .a5..`...
000090C0  58 59 5A 20 20 20 20 20  20 20 20 10 00 4C 76 75   XYZ        ..Lvu
000090D0  C7 3A C7 3A 00 00 77 75  C7 3A 06 00 00 00 00 00   Ç:Ç:..wuÇ:......
000090E0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
000090F0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

- Beginning of FAT 1:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
00001000  F8 FF FF FF FF FF 04 00  05 00 FF FF FF FF 08 00   øÿÿÿÿÿ....ÿÿÿÿ..
00001010  FF FF FF FF 00 00 00 00  00 00 00 00 00 00 00 00   ÿÿÿÿ............
00001020  00 00 00 00 00 00 00 00  00 00 16 00 FF FF 00 00   ............ÿÿ..
00001030  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00001040  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

- Cluster 6th:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
0000E000  2E 20 20 20 20 20 20 20  20 20 20 10 00 4C 76 75   .          ..Lvu
0000E010  C7 3A C7 3A 00 00 77 75  C7 3A 06 00 00 00 00 00   Ç:Ç:..wuÇ:......
0000E020  2E 2E 20 20 20 20 20 20  20 20 20 10 00 4C 76 75   ..         ..Lvu
0000E030  C7 3A C7 3A 00 00 77 75  C7 3A 00 00 00 00 00 00   Ç:Ç:..wuÇ:......
0000E040  45 52 52 4F 52 20 20 20  4C 4F 47 20 18 C1 79 75   ERROR   LOG .Áyu
0000E050  C7 3A C7 3A 00 00 EE 76  14 37 07 00 50 05 00 00   Ç:Ç:..îv.7..P...
0000E060  45 42 43 44 49 43 20 20  44 41 54 20 10 B0 7D 75   EBCDIC  DAT .°}u
0000E070  C7 3A C7 3A 00 00 A0 08  61 35 09 00 00 02 00 00   Ç:Ç:.. .a5......
0000E080  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
0000E090  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

a) Fill the information of volume

| No. | Content | Value |
|-----|---------|-------|
| 1 | FAT type | |
| 2 | Bytes per sector | |

| 3 | Sectors per cluster | |
|----|------------------------------|---|
| 4 | Size of reserved area, in sectors | |
| 5 | Number of FATs | |
| 6 | Number of sector for RDET | |
| 7 | Number of sector on disk | |
| 8 | Number of sectors per FAT | |
| 9 | First sector of FAT1 | |
| 10 | First sector of RDET | |
| 11 | First sector of Data | |

b) Draw directory of the Volume, with the cluster numbers of every file, directory.

**_Problem 2_**: Given volume:

- BootSector:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
00000000  EB 3C 90 52 41 4D 44 53  4B 58 50 00 02 02 01 00   ë<□RAMDSKXP.....
00000010  02 00 02 00 00 F8 28 00  20 00 40 00 20 00 00 00   .....ø(. .@. ...
00000020  E0 4F 00 00 80 00 29 00  20 66 EE 52 41 4D 44 49   àO..€.). fîRAMDI
00000030  53 4B 58 50 20 20 46 41  54 31 36 20 20 20 33 C9   SKXP  FAT16   3É
00000040  8E D1 BC F0 7B 8E D9 B8  00 20 8E C0 FC BD 00 7C   ŽÑ¼ð{ŽÙ¸. ŽÀü½.|
```

- RDET:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
0000A200  53 41 4D 50 4C 45 20 20  57 48 53 20 18 1F A7 3E   SAMPLE  WHS ..§>
0000A210  D5 3A D5 3A 00 00 A0 08  61 35 02 00 03 08 00 00   Õ:Õ:.. .a5......
0000A220  42 54 00 46 00 53 00 2E  00 74 00 0F 00 FC 70 00   BT.F.S...t...üp.
0000A230  6C 00 00 00 FF FF FF FF  FF FF 00 00 FF FF FF FF   l...ÿÿÿÿÿÿ..ÿÿÿÿ
0000A240  01 42 00 6F 00 6F 00 74  00 20 00 0F 00 FC 53 00   .B.o.o.t. ...üS.
0000A250  65 00 63 00 74 00 6F 00  72 00 00 00 20 00 4E 00   e.c.t.o.r... .N.
0000A260  42 4F 4F 54 53 45 7E 31  54 50 4C 20 00 AA A9 3E   BOOTSE~1TPL .ª©>
0000A270  D5 3A D5 3A 00 00 A0 08  61 35 05 00 4B 06 00 00   Õ:Õ:.. .a5..K...
0000A280  49 4E 4F 44 45 20 20 20  54 50 4C 20 18 C0 B4 3E   INODE   TPL .À´>
0000A290  D5 3A D5 3A 00 00 A0 08  61 35 07 00 A0 04 00 00   Õ:Õ:.. .a5.. ...
0000A2A0  54 4D 43 20 20 20 20 20  20 20 20 10 00 AF B9 3E   TMC        ..¯¹>
0000A2B0  D5 3A D5 3A 00 00 BA 3E  D5 3A 09 00 00 00 00 00   Õ:Õ:..º>Õ:......
0000A2C0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
0000A2D0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

- FAT1:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
00000200  F8 FF FF FF 03 00 04 00  FF FF 06 00 FF FF 08 00   øÿÿÿ....ÿÿ..ÿÿ..
00000210  FF FF FF FF FF FF 0C 00  FF FF 0E 00 FF FF 00 00   ÿÿÿÿÿÿ..ÿÿ..ÿÿ..
00000220  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
00000230  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

- Sector 127:

```
Offset    0  1  2  3  4  5  6  7   8  9  A  B  C  D  E  F
0000FE00  2E 20 20 20 20 20 20 20  20 20 20 10 00 AF B9 3E   .          ..¯¹>
0000FE10  D5 3A D5 3A 00 00 BA 3E  D5 3A 09 00 00 00 00 00   Õ:Õ:..º>Õ:......
0000FE20  2E 2E 20 20 20 20 20 20  20 20 20 10 00 AF B9 3E   ..         ..¯¹>
0000FE30  D5 3A D5 3A 00 00 BA 3E  D5 3A 00 00 00 00 00 00   Õ:Õ:..º>Õ:......
0000FE40  57 49 4E 48 45 58 20 20  43 4E 54 20 18 65 BC 3E   WINHEX  CNT .e¼>
0000FE50  D5 3A D5 3A 00 00 A0 08  61 35 0B 00 71 06 00 00   Õ:Õ:.. .a5..q...
0000FE60  45 52 52 4F 52 20 20 20  4C 4F 47 20 18 B9 C2 3E   ERROR   LOG .¹Â>
0000FE70  D5 3A D5 3A 00 00 EE 76  14 37 0D 00 50 05 00 00   Õ:Õ:..îv.7..P...
0000FE80  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
0000FE90  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ................
```

a) Fill information of the Volume

| STT | Nội dung | Giá trị |
|-----|----------|---------|
| 1 | FAT type | |

| 2 | Bytes per sector | |
|---|---|---|
| 3 | Sectors per cluster | |
| 4 | Sectors in reserved area | |
| 5 | Sectors per FAT | |
| 6 | Number of FATs | |
| 7 | Number of sectors for RDET | |
| 8 | Number of sectors of disk | |
| 9 | First Sector of FAT1 | |
| 10 | First Sector of RDET | |
| 11 | First Sector of Data | |

b) Draw directory of the Volume, with the cluster numbers of every file, directory.

c) After MOVE ERROR.LOG into root directory, this operation will effect on:
   i. Check "x" if unchanged
   ii. If changed, write the modified sector numbers. If all sectors of a part are changed, write ALL

| | Unchanged | Modified (sector number) |
|---|---|---|
| **FAT1** | | |
| **FAT2** | | |
| **RDET** | | |
| **Data** | | |

d) After DELETE file WINHEX.CNT, this operation will effect on:
   iii. Check "x" if unchanged
   iv. If changed, write the modified sector numbers. If all sectors of a part are changed, write ALL.

| | Unchanged | Modified (sector number) |
|---|---|---|
| **FAT1** | | |
| **FAT2** | | |
| **RDET** | | |
| **Data** | | |