Indian Institute of Technology Mandi
IC150: Computation for Engineers
Tutorial 3 Arrays, File IO

1) Fill in the blanks

   (a) Input/output in C occurs as a _____ of bytes.

   (b) Most C programs should include the _____ header file that contains basic information required for all I/O operations.

   (c) Opening a file in _____ and _____ modes destroys the existing contents of the file.

   (d) The best-case time complexity of Insertion Sort is _____while that of Selection Sort is _____.

   (e) Name an unstable sorting algorithm: _____.

   (f) An array is declared: `NewType mda[M][N][P]`. Assume that `M`, `N` and `P` are constants and the base of the array is at address `base`. The address of element `mda[i][j][k]` is given by `adr =` _____.

2) An array is declared: `double d[5][2];` The base of the array is memory location 200. Assume that a double occupies 8 bytes. Draw a neat memory diagram of the array showing the addresses of the elements `d[i][0]` for i in the range [0..4].

3) An array is declared: `char c[2][3][4];` The base of the array is memory location 500. Draw a neat memory diagram of the array showing the addresses of the elements `c[0][1][0]`, `c[0][2][0]`, `c[1][1][0]`.

4) An array is declared: `struct {int a; char c[4]; } s[2][3];` The base of the array is memory location 1000. Draw a neat memory diagram of the array. What is the total space occupied by the array?

5) The file `marks.list` contains the marks of students in a batch. The information for each student is on one lines: his/her name followed by his/her marks, separated by `':'`. Eg:

```
A.N. Aardvark:43
Eager Beaver:98
```

   Design a program that read `marks.list` and creates two output files, `marks.only` and `name.only`. These contain only the `marks` and `name` respectively, all on one line separated by `':'`. There is no `':'` after the last entry on the line. Eg:

   marks.only – `43:98`
   name.only – `A.N. Aardvark:Eager Beaver`

   (a) Draw a neat flow-chart for the program
   (b) Write pseudo-code corresponding to the flow-chart. Write a serial number for each line.
   (b) Convert the pseudo-code to C code. Indicate the serial numbers from (b) in comments.
   (c) Modify the C code to avoid the trailing `':'` in the output files.

6) It is desired to read an integer from a file `input.data` into the variable `n`. C has several I/O mechanisms and functions that could be used for this purpose. Give 6 different methods (C code and/or shell command) that equivalently accomplish this purpose.