

CT5102: Programing for Data Analytics 2018/19

Assignment 3: Functionals (10 marks)

Given a matrix of exam scores for 10 students:

```
set.seed(10)
N=10
cs1 <- rnorm(N,72,10)
cs2 <- rnorm(N,65,7)
cs3 <- rnorm(N,80,9)
cs4 <- rnorm(N,55,7)
cs5 <- rnorm(N,61,5)

> m
      cs1      cs2      cs3      cs4      cs5
1  72.18746 72.71246 74.63320 42.02382 66.43276
2  70.15747 70.29047 60.33242 54.45438 57.18728
3  58.28669 63.33237 73.92621 61.77996 56.85669
4  66.00832 71.91211 60.92845 56.29448 65.17237
5  74.94545 70.18973 68.61322 45.34039 56.16174
6  75.89794 65.62543 76.63705 44.95140 60.85592
7  59.91924 58.31539 73.81200 57.53461 62.16263
8  68.36324 63.63395 72.15057 42.68639 59.49396
9  55.73327 71.47865 79.08415 52.72819 57.61193
10 69.43522 68.38085 77.71598 50.43906 64.27614
```

Generate the following ranked output using apply functions (loops cannot be used).

```
> ans
      cs1 cs2 cs3 cs4 cs5
Student#1    3  1  4 10  1
Student#2    4  4 10  4  8
Student#3    9  9  5  1  9
Student#4    7  2  9  3  2
Student#5    2  5  8  7 10
Student#6    1  7  3  8  5
Student#7    8 10  6  2  4
Student#8    6  8  7  9  6
Student#9   10  3  1  5  7
Student#10    5  6  2  6  3
```

Based on this output, calculate the median rank for each student as follows.

```
      cs1 cs2 cs3 cs4 cs5 median
Student#1    3  1  4 10  1      3
Student#2    4  4 10  4  8      4
Student#3    9  9  5  1  9      9
Student#4    7  2  9  3  2      3
Student#5    2  5  8  7 10      7
Student#6    1  7  3  8  5      5
Student#7    8 10  6  2  4      6
Student#8    6  8  7  9  6      7
Student#9   10  3  1  5  7      5
Student#10    5  6  2  6  3      5
```