Polytechnic Tutoring Center

Midterm 1 REVIEW – CS1133, Spring 2021

Disclaimer: This mock exam is only for practice. It was made by tutors in the Polytechnic Tutoring Center and is not representative of the actual exam given by the Academic Department.

Question 1

A professor has a matrix, in which each row contains the quiz scores of a particular student. The professor notices that none of the students received a very good score on the third quiz, as well as the most recent quiz. As a result, she decides to delete the score of the third quiz, then replace the grade for the most recent quiz with the average of all the previous quiz grades.
The quizzes on which the students scored badly (quizzes 3 and 9), are stored in a matrix called BG, while the grades for the rest of the quizzes (1, 2, 4, 5, 6, 7, and 8) are stored in a matrix called GG. These matrices are given to you, with grades for a particular quiz corresponding to the order listed in parentheses in the previous sentence (ex: in BG, the first column contains grades for quiz 3 and the second column contains grades for quiz 9).

```
GG =

    70    95    52    87    54    60    51
    93    98    95    86    78    89    80
    52    97    87    93    84    54    54
    69   100    81    96    55    70    71
    57    70    88    63    66    80   100
    52    83    64    85   100    60    92
    85    91    60    81    95    85    52
    96    81    83    53    51    80    87
    69    85    97    59    94    73    55
    62    74    91    67    62    62    74
    96    75    67    65    72    71    94
    85    89    63    71    56    89    50
```

```
BG =

    41    25
    40    12
    10    28
    46    35
    35    42
    45    45
```

36	22
25	20
42	23
5	16
2	23
17	49

The professor would like all of the grades arranged in a single matrix called GRADES before the grades of the third quiz are deleted. Write a program which will complete these operations for all the students at once. Your program should display GRADES both before and after the operations related to quizzes 3 and 9 are done, as shown below.

Before Operations:

70	95	41	52	87	54	60	51	25
93	98	40	95	86	78	89	80	12
52	97	10	87	93	84	54	54	28
69	100	46	81	96	55	70	71	35
57	70	35	88	63	66	80	100	42
52	83	45	64	85	100	60	92	45
85	91	36	60	81	95	85	52	22
96	81	25	83	53	51	80	87	20
69	85	42	97	59	94	73	55	23
62	74	5	91	67	62	62	74	16
96	75	2	67	65	72	71	94	23
85	89	17	63	71	56	89	50	49

After Operations:

70.0000	95.0000	52.0000	87.0000	54.0000	60.0000	51.0000	67.0000
93.0000	98.0000	95.0000	86.0000	78.0000	89.0000	80.0000	88.4286
52.0000	97.0000	87.0000	93.0000	84.0000	54.0000	54.0000	74.4286
69.0000	100.0000	81.0000	96.0000	55.0000	70.0000	71.0000	77.4286
57.0000	70.0000	88.0000	63.0000	66.0000	80.0000	100.0000	74.8571
52.0000	83.0000	64.0000	85.0000	100.0000	60.0000	92.0000	76.5714
85.0000	91.0000	60.0000	81.0000	95.0000	85.0000	52.0000	78.4286
96.0000	81.0000	83.0000	53.0000	51.0000	80.0000	87.0000	75.8571
69.0000	85.0000	97.0000	59.0000	94.0000	73.0000	55.0000	76.0000
62.0000	74.0000	91.0000	67.0000	62.0000	62.0000	74.0000	70.2857
96.0000	75.0000	67.0000	65.0000	72.0000	71.0000	94.0000	77.1429
85.0000	89.0000	63.0000	71.0000	56.0000	89.0000	50.0000	71.8571

Question 2

Write a program that turns a vector of sequential odd numbers into a T-matrix. That is to say that the top row of the matrix is the initial vector and the middle column of the matrix consists of the middle value of the vector, followed by the vector again. Then the remaining terms in the matrix are all zeros. Your code should allow the user to input the length of the odd vector during run-time. Below is a sample output.

```
Enter an odd number: 7


OddVec =

     1     2     3     4     5     6     7


MTX =

     1     2     3     4     5     6     7
     0     0     0     1     0     0     0
     0     0     0     2     0     0     0
     0     0     0     3     0     0     0
     0     0     0     4     0     0     0
     0     0     0     5     0     0     0
     0     0     0     6     0     0     0
     0     0     0     7     0     0     0
```

Question 3

Rachel is trying to decide what players to add to her fantasy basketball team. She's never participated in a fantasy sports league before and wants to make sure she picks the best players. She researches some prospective players on the internet to find out about three important statistics: average points per game, average rebounds per game, and average fouls per game.

Rachel wants high-scoring players, those who score at least 25 points per game. She wants players with between 12 and 15 rebounds per game (including those who have 12 and 15 rebounds). She does not want any player who averages more than 2 fouls per game. After doing some research, Rachel compiled a list of prospective players, along with statistics on average points per game, average rebounds per game, and average fouls per game for each player.

Write a program which will determine which players fit at least any two of Rachel's 3 specifications. All the information Rachel found about each player is contained in a matrix called STATS, which is given to you. Use the following code to create STATS, or copy and paste the STATS matrix below into your code. (Note: if you use the code to create STATS, the value of the matrix will change every time. This means the correct output display will change as well.)

MATLAB Code to Create STATS Matrix

```
clear; clc;
nPlayers = 15;
goodAmtPts = 30;
foulLimit = 4;
goodAmtRe = 23;
IDs = randi([1,121],nPlayers,1);
Points = randi([1,goodAmtPts],nPlayers,1);
Rebounds = randi([1,goodAmtRe],nPlayers,1);
Fouls = randi([1,foulLimit],nPlayers,1);
STATS = [IDs Points Rebounds Fouls];
```

STATS Matrix

```
STATS =

    88     6    15     4
     2    25    13     1
```

```
 46    22     3     4
112    16     4     4
 67    25     1     3
 58    16    10     1
 61    17    12     2
 38     7     4     4
116    18    16     3
119     5     1     2
 63     2     3     3
121    21    22     1
 56    19    23     3
 52     7     1     4
 26    13    12     4
```

Information on each player is contained within a separate row of the matrix. The first column contains an ID number corresponding to each player. The second, third, and fourth columns correspond to the average points per game, average rebounds per game, and average fouls per game for each player, respectively. Your program should output a vector containing the ID numbers of the players which meet two of the three criteria. Your output displays should resemble the following.

```
The best players on the list are:   2  61
```