INFORMATION SYSTEMS

3

Programming Techniques 2011 exam Paper

Q5. A i. i no saddle pnt

1	2	3	4	1
3	9	1	5	1
10	5	4	5	4
12	5	7	8	5
12	9	7	8	

ii. 4x4 1 saddl pnt.

(7)	8	9	10	7
6	2	7	8	2
5	3	6	1	1
4	1	5	9	1
7	8	9	10	

7 is saddle pnt

iii. 2 saddle pnt.

7	7	5	4	3
6	5	4	8	4
7	9	10	7	
4	3	2	6	
2	4	1	5	
7	11	12	7	

The 7's are saddle pnts

- Suppose a and b are two saddle points in matrix
- If they lie in same row, then since a is smallest entry in row, $a \leq b$, but b is also smallest entry in its row so $b \leq a \Rightarrow b = a$

- for some column, both are larger entry in the column, b both $a \geq b$ and $b \geq a \Rightarrow a = b$

INFORMATION

4

Q5.

If they lie in different row and column, then they form opposite corners of a rectangle in the matrix,

a . . . c
.
.
d . . . b

- Since a is smallest entry in its row and b largest in its colum we have $a \leq c \leq b$
- but b is smallest entry in its row and a largest in its colum so $b \leq d \leq a$
- Putting together we have $a \leq c \leq b \leq d \leq a$
- But since same number lies at both ends of equality all four numbers must be equal
- Shows us $a = b$ but cond d are also saddle point

(ii.

```
Basic_Matrix transpose(){
  Basic_Matrix rslt = new Basic_Matrix(cols, rows);
  for (int i=0; i<cols; i++){
      for (int j=0; j<rows; j++){
          result[i][j] = mat[j][i];
      }
  }
  return result;
}
```

(iii

```
void all_saddle(Basic_Matrix m){
  double[] mins, maxes;
  boolean found=false;
  Basic_Matrix mt;

  mins = m.m_row();
  mt = m.transpose();
  maxes = mt.max_row();
```

5)

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Q5.

```
For (int i=0; i<m.rows; i++){
    for (int j=0; j<m.rows; j++){
        if (mins[i] == maxs[j]){
        found = true;
        print_Saddle (m.mat, i, j);
        }
    }
}
if (!found) print "no Saddle";
}//end
```