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Algorithm Steps for the Project:

1. $\text{PointSet} \leftarrow \text{given}$, $K \leftarrow \text{given}$
2. Randomly Select K centroids from the data
3. $\text{Change} \leftarrow 0$
4. For each P in PointSet , compute the distance to each centroid
5. $\text{minLabel} \leftarrow \text{label for the centroid related to the minimum distance}$
6. if $P.\text{label} \neq \text{minLabel}$
7. $P.\text{label} \leftarrow \text{minLabel}$
8. $\text{Changes} ++$
9. End-if
10. Repeat 4 to 9 until all P are processed
11. If $\text{changes} > 2$:
12. Compute K centroids
13. End-if
14. Repeat 3 to 13 while $\text{change} > 2$

Main.java

```
import java.io.BufferedReader;
import java.io.BufferedWriter;
import java.io.FileReader;
import java.io.FileWriter;

public class Main {

    public static void main(String[] args){
        try{
            BufferedReader br = new BufferedReader(new FileReader(args[0]));
            int k = Integer.parseInt(args[1]);
            BufferedWriter bw1 = new BufferedWriter(new FileWriter(args[2]));
            BufferedWriter bw2 = new BufferedWriter(new FileWriter(args[3]));

            Kmean kmean = new Kmean(br, k);

            kmean.kMeansClustering(bw1, bw2);

            br.close();
            bw1.close();
            bw2.close();

        }catch(Exception e){
            System.out.println(e.getMessage());
        }
    }
}
```

Point.java

```
public class Point {
    public int label;
    public double distance;
    public double x;
    public double y;
    public Point(Double X, Double Y){
        label = 0;
        x = X;
        y = Y;
    }
    public void plot(int[][] array){

    }
}
```

Kmeans.java

```
import java.io.BufferedReader;
import java.io.BufferedWriter;
import java.util.Random;
import java.util.StringTokenizer;

public class Kmean{

    public int k, numPts, numRows, numCols, change;
    public int[][] displayArray;
    public Point[] pointSet;
    public Point[] kCentroidArray;

    public Kmean(BufferedReader br, int K){
        change = 0;
        k = K;
        try{
            StringTokenizer st = new StringTokenizer(br.readLine());
            numRows = Integer.parseInt(st.nextToken());
            numCols = Integer.parseInt(st.nextToken());
            st = new StringTokenizer(br.readLine());
            numPts = Integer.parseInt(st.nextToken());

            displayArray = new int[numRows][numCols];
```

```
        pointSet = new Point[numPts];

        kCentroidArray = new Point[k + 1];

        loadPointSet(br, st);

    }catch(Exception E){
        System.out.println(E.getMessage());
        System.exit(0);
    }
}

public void loadPointSet(BufferedReader br, StringTokenizer st){
    try{
        for(int i = 0; i < numPts; ++i){
            st = new StringTokenizer(br.readLine());
            pointSet[i] = new Point(Double.parseDouble(st.nextToken()),
Double.parseDouble(st.nextToken()));
        }
    }catch(Exception E){
        System.out.println(E.getMessage());
        System.exit(0);
    }
}

public void kMeansClustering(BufferedWriter first, BufferedWriter second){
    int iter = 0, change, minLabel;
    selectKCentroids();
    do{
        change = 0;
        ++iter;
        plotDisplayArray();
        prettyPrint(first, iter);
        for(Point p : pointSet){
            minLabel = distanceMinLabel(p, p.distance);
            if (p.label != minLabel){
                p.label = minLabel;
                p.distance = computeDistance(p, p.label);
                ++change;
            }
        }
        if(change >= 2) computeCentroids();
    }while(change > 2);
}
```

```
        try{
            second.write(Integer.toString(numRows) + " " +
Integer.toString(numCols) + "\n");
            second.write(Integer.toString(numPts) + "\n");
            for(Point P : pointSet){
                second.write(Integer.toString((int)P.x) + " " +
Integer.toString((int)P.y) + " " + Integer.toString((int)P.label) + "\n");
            }
        }catch(Exception E){
            System.out.println(E.getMessage());
            System.exit(0);
        }
    }

    public void selectKCentroids(){
        boolean[] arr = new boolean[numPts];
        Random rand = new Random();
        for(int i = 0; i < arr.length; ++i){
            arr[i] = true;
        }
        int index;
        for(int i = 1; i <= k; ++i){
            index = 0;
            do{
                index = rand.nextInt(numPts);
            }while(!arr[index]);
            kCentroidArray[i] = new Point(pointSet[index].x, pointSet[index].y);
            kCentroidArray[i].label = index;
            kCentroidArray[i].distance = 0;
            arr[index] = false;
        }

        for(Point p : pointSet){
            p.label = rand.nextInt(k) + 1;
            p.distance = computeDistance(p, p.label);
        }
    }

    public void computeCentroids(){
        double[] sumX = new double[k+1];
        double[] sumY = new double[k+1];
        int[] totalPt = new int[k+1];
        for(int i = 0; i <= k; ++i){
```

```
        sumX[i] = 0.0;
        sumY[i] = 0.0;
        totalPt[i] = 0;
    }
    for(int i = 0; i < numPts; ++i){
        sumX[pointSet[i].label] += pointSet[i].x;
        sumY[pointSet[i].label] += pointSet[i].y;
        totalPt[pointSet[i].label]++;
    }
    for(int i = 1; i <= k; ++i){
        if(totalPt[i] > 0){
            kCentroidArray[i].x = sumX[i] / totalPt[i];
            kCentroidArray[i].y = sumY[i] / totalPt[i];
        }
    }
}

public int distanceMinLabel(Point p, double minDist){
    int minLabel = p.label;
    double currDist = 0;
    for(int i = 1; i <= k; ++i){
        currDist = computeDistance(p, i);
        if (currDist < minDist){
            minDist = currDist;
            minLabel = i;
        }
    }
    return minLabel;
}

public double computeDistance(Point p, int centroidLabel){
    double dx = p.x - kCentroidArray[centroidLabel].x;
    double dy = p.y - kCentroidArray[centroidLabel].y;
    return Math.sqrt(dx*dx + dy*dy);
}

public void plotDisplayArray(){
    for(int i = 0; i < numRows; ++i){
        for(int j = 0; j < numCols; ++j){
            displayArray[i][j] = 0;
        }
    }
    int i = 0;
    int j = 0;
```

```
        for(Point p : pointSet){
            i = (int)Math.floor(p.x);
            j = (int)Math.floor(p.y);
            displayArray[i][j] = p.label;
        }
    }

    public void prettyPrint(BufferedWriter bw, int iteration){
        try{
            char[] outp = new char[1];
            bw.write("Printing Iteration " + Integer.toString(iteration)+ " and k
= " + Integer.toString(k) + "\n");
            for(int i = 0; i < numRows; ++i){
                for(int j = 0; j < numCols; ++j){
                    int value = 'A' - 1 + displayArray[i][j];
                    if (value < 'A') outp[0] = '.';
                    else outp[0] = (char)value;
                    bw.write(outp);
                    bw.write(" ");
                }
                bw.write("\n");
            }
        }catch(Exception E){
            System.out.println(E.getMessage());
            System.exit(0);
        }
    }
}
```

ONE OUTPUT FOR EACH K = (3 | 4 | 5)

The rest of the outputs will be inside of the jar. This file will be too large with them all. Starts on the next page

Printing Iteration 1 and k = 3

```

.....
.....AB.....
.....A.....
...B.ABABC.....
...ABB.B.....
...C.C.B.....
..BCCB..CAA.....AA.CA.....
..B.AACBCBC.....C.AACAC.....
..BBAB.A.....C.....B.CBC.BC.....
...A..BACA.....A..BA.A.ACBCAA.....
..CA.A.CB.A.....C..C.AA.CB.BA.CB.....
...AA.C.A..B.....AB...A..CACBC.....
...BB.BB..CB.....A.B.C.B.....BAC.....
....CC.AC.....C.C.B.B.CC.....
.....A.....CBAABC.CC.....CCC..BCA...
...AB...CA.....A.A.AB.BA.....ABA.....
.....A...C.BB.AC.....BBA.....
.....B...A.C.....ABAC.ABB...
.....C.....B...CBAC...
.....A.BCACCA.CBC...
.....CAAB.....
.....CCC...AAC...
.....BABC.....
.....BACC...
.....CBBA.....
.....AAB...
..AAC..BB.....CBB.....
...A.ACCB.....
...A.AB.AAAB.....BA.....
..CB.ABAC.....AC.AA..B.....
..BCAC.B..AC.....AB...BBB.C.....
.CBA.BB..BB.....CA.CC..AC.....
..BA..AC.....BC.BC..BC.....
...AAA.ACC.....CC..AB.C.....
.....CCA.....CAA.C..B.....
.CBC.....CC..CB.B.....B.....
...CCA.....CBA.AAA.CCB.....BBBB...
.....B.AB..CB.....B..BCCB...
.....B...ACA.ABA.....B..BBBAB...
.....C...BBBCBC.CCA.....ABC..CCCC..
.....A.....A..AABA.....
.....BC.CAA.....B.B..C..CAAA..
.....AAB.ABA.....B..BBCA...
.....AC..AA.....B..BACC...
.....

```


Printing Iteration 2 and k = 3

```

.....
.....CC.....
.....C.....
...C.CCCCC.....
...CCC.C.....
...C.C.C.....
..CCCC..CCC.....CC.CC.....
..C.CCCCCC.....C.CCCCC.....
..CCCC.C.....C...C.CCC.CC.....
...C..CCCC.....C..CC.C.CCCCC.....
..CC.C.CC.C.....C..C.CC.CC.CC.CC.....
...CC.C.C..C.....CC..C..CCCC.....
...CC.CC..CC.....C.C.C.C.....CCC.....
...CC.CC.....C.C.C.C.CC.....
.....C.....CCCCC.CC.....CCC..BBB...
...CC..CC.....C.C.CC.CC.....BBB.....
.....C..C.CC.CC.....BBB.....
.....C..C.C.....BBBB.BBB...
.....C.....B..BBBB...
.....C.BBBBBB.BBB...
.....BBBB.....
.....BBB..BBB...
.....BBBB.....
.....BBBB.....
.....BBB.....
..CCC..AA.....BBB.....
..A.AAAA.....
...A.AA.AAAA.....AA.....
..AA.AAAA.....AA.AA..A.....
..AAAA.A..AA.....AA...AAA.A.....
..AAA.AA..AA.....AA.AA..AA.....
..AA..AA.....AA.AA..AA.....
...AAA.AAA.....AA..AA.A.....
....AAA.....AAA.A..A.....
..AAA.....AA..AA.A.....B.....
...AAA.....AAA.AAA.AAA.....BBBB.....
.....A.AA..AA.....B..BBBB...
.....A.....AAA.AAA.....B..BBBBB...
.....A.....AAAAAA.AAA.....BBB..BBBB...
.....A.....B..BBBB.....
.....AA.AAA.....B.B..B..BBBB...
.....AAA.AAA.....B..BBBB...
.....AA..AA.....B..BBBB...
.....

```

Printing Iteration 3 and k = 3

```

.....
.....CC.....
.....C.....
...C.CCCCC.....
...CCC.C.....
...C.C.C.....
..CCCC..CCC.....CC.CC.....
..C.CCCCCC.....C.CCCCC.....
..CCCC.C.....C...C.CCC.CC.....
...C..CCCC.....C..CC.C.CCCCC.....
..CC.C.CC.C.....C..C.CC.CC.CC.CC.....
...CC.C.C..C.....CC..C..CCCC.....
...CC.CC..CC.....C.C.C.C.....BBB.....
...CC.CC.....C.C.C.C.CC.....
.....C.....CCCCC.CC.....BBB..BBB...
...CC..CC.....C.C.CC.CC.....BBB.....
.....C...C.CC.CC.....BBB.....
.....C...C.C.....BBBB.BBB...
.....C.....B...BBBB...
.....B.BBBBBB.BBB...
.....BBBB.....
.....BBB...BBB...
.....BBBB.....
.....BBBB.....
.....BBB.....
..AAA..AA.....BBB.....
..A.AAAA.....
...A.AA.AAAA.....AA.....
..AA.AAAA.....AA.AA..A.....
..AAAA.A..AA.....AA...AAA.A.....
..AAA.AA..AA.....AA.AA..AA.....
..AA..AA.....AA.AA..AA.....
...AAA.AAA.....AA..AA.A.....
....AAA.....AAA.A..A.....
..AAA.....AA..AA.A.....B.....
...AAA.....AAA.AAA.AAA.....BBBB.....
.....A.AA..AA.....B..BBBB...
.....A.....AAA.AAA.....B..BBBBB...
.....A...AAAAA.AAA.....BBB..BBBB...
.....A.....B..BBBB.....
.....AA.AAA.....B.B..B..BBBB...
.....AAA.AAA.....B..BBBB...
.....AA..AA.....B..BBBB...
.....

```

| | | |
|---------|---------|---------|
| 45 60 | 5 5 3 | 10 27 3 |
| 399 | 3 5 3 | 9 27 3 |
| 41 56 2 | 3 6 3 | 9 29 3 |
| 41 57 2 | 5 7 3 | 9 30 3 |
| 42 29 1 | 6 2 3 | 9 31 3 |
| 42 30 1 | 40 53 2 | 9 32 3 |
| 1 6 3 | 40 54 2 | 10 28 3 |
| 2 4 3 | 7 4 3 | 10 30 3 |
| 3 3 3 | 7 5 3 | 10 31 3 |
| 3 7 3 | 6 4 3 | 10 33 3 |
| 3 8 3 | 6 5 3 | 10 34 3 |
| 34 30 1 | 6 8 3 | 10 36 3 |
| 34 32 1 | 6 9 3 | 10 37 3 |
| 34 35 1 | 6 10 3 | 11 4 3 |
| 35 1 1 | 6 25 3 | 11 5 3 |
| 41 58 2 | 6 29 3 | 11 7 3 |
| 42 28 1 | 7 6 3 | 11 9 3 |
| 35 2 1 | 7 7 3 | 11 12 3 |
| 35 3 1 | 6 26 3 | 11 22 3 |
| 35 26 1 | 6 28 3 | 11 23 3 |
| 3 9 3 | 7 8 3 | 11 33 3 |
| 6 3 3 | 7 9 3 | 11 34 3 |
| 7 2 3 | 7 10 3 | 12 3 3 |
| 4 4 3 | 16 53 2 | 12 4 3 |
| 1 7 3 | 16 54 2 | 12 6 3 |
| 4 5 3 | 17 22 3 | 12 7 3 |
| 39 51 2 | 17 26 3 | 12 10 3 |
| 39 54 2 | 8 20 3 | 12 11 3 |
| 39 55 2 | 8 25 3 | 12 25 3 |
| 39 56 2 | 8 27 3 | 12 27 3 |
| 39 57 2 | 9 9 3 | 12 29 3 |
| 40 32 1 | 9 21 3 | 12 31 3 |
| 40 48 2 | 11 27 3 | 12 51 2 |
| 20 53 2 | 11 30 3 | 12 52 2 |
| 20 54 2 | 11 31 3 | 12 53 2 |
| 21 48 2 | 11 32 3 | 13 5 3 |
| 21 49 2 | 9 24 3 | 13 6 3 |
| 40 51 2 | 9 25 3 | 13 8 3 |
| 40 52 2 | 9 33 3 | 13 9 3 |
| 41 26 1 | 9 34 3 | 13 24 3 |
| 41 27 1 | 10 2 3 | 17 28 3 |
| 41 29 1 | 10 3 3 | 17 50 2 |
| 4 6 3 | 10 5 3 | 8 7 3 |
| 4 8 3 | 10 7 3 | 13 32 3 |
| 5 3 3 | 10 8 3 | 13 33 3 |
| | 10 10 3 | 14 7 3 |
| | 10 22 3 | 14 25 3 |
| | 10 25 3 | 14 26 3 |

| | | |
|---------|---------|---------|
| 14 27 3 | 13 26 3 | 27 8 1 |
| 14 28 3 | 13 28 3 | 39 30 1 |
| 14 29 3 | 13 30 3 | 39 31 1 |
| 14 30 3 | 17 51 2 | 39 33 1 |
| 7 24 3 | 17 52 2 | 41 30 1 |
| 7 26 3 | 17 53 2 | 41 31 1 |
| 7 27 3 | 17 55 2 | 41 47 2 |
| 7 28 3 | 39 34 1 | 28 4 1 |
| 14 32 3 | 39 35 1 | 28 6 1 |
| 14 33 3 | 39 49 2 | 28 7 1 |
| 14 49 2 | 39 50 2 | 28 9 1 |
| 14 50 2 | 18 53 2 | 28 10 1 |
| 14 51 2 | 18 54 2 | 28 11 1 |
| 14 54 2 | 18 55 2 | 28 12 1 |
| 14 55 2 | 18 56 2 | 28 29 1 |
| 14 56 2 | 19 45 2 | 28 30 1 |
| 15 4 3 | 19 47 2 | 29 2 1 |
| 15 5 3 | 19 48 2 | 29 3 1 |
| 15 9 3 | 19 49 2 | 29 5 1 |
| 15 10 3 | 19 50 2 | 29 6 1 |
| 15 24 3 | 19 51 2 | 29 7 1 |
| 15 26 3 | 19 52 2 | 29 8 1 |
| 15 28 3 | 19 54 2 | 29 29 1 |
| 15 29 3 | 19 55 2 | 29 30 1 |
| 15 31 3 | 19 56 2 | 29 32 1 |
| 15 32 3 | 20 51 2 | 29 33 1 |
| 15 51 2 | 20 52 2 | 29 36 1 |
| 15 52 2 | 21 50 2 | 30 2 1 |
| 15 53 2 | 21 55 2 | 30 3 1 |
| 16 23 3 | 21 56 2 | 30 4 1 |
| 16 27 3 | 24 51 2 | 30 5 1 |
| 16 29 3 | 24 52 2 | 30 7 1 |
| 16 30 3 | 24 53 2 | 30 10 1 |
| 42 56 2 | 25 55 2 | 30 11 1 |
| 43 26 1 | 25 56 2 | 30 26 1 |
| 43 27 1 | 25 57 2 | 30 27 1 |
| 7 29 3 | 26 2 1 | 38 35 1 |
| 7 30 3 | 26 3 1 | 38 48 2 |
| 8 2 3 | 26 4 1 | 38 51 2 |
| 8 3 3 | 26 7 1 | 38 52 2 |
| 8 4 3 | 26 8 1 | 31 6 1 |
| 8 5 3 | 26 52 2 | 31 9 1 |
| 43 30 1 | 26 53 2 | 31 10 1 |
| 43 31 1 | 26 54 2 | 31 26 1 |
| 16 32 3 | 27 3 1 | 31 27 1 |
| 16 33 3 | 27 5 1 | 31 29 1 |
| 16 52 2 | 27 6 1 | 31 30 1 |
| | 27 7 1 | 31 33 1 |

| | | |
|---------|---------|---------|
| 31 34 1 | 36 54 2 | 43 52 2 |
| 32 2 1 | 36 55 2 | 43 53 2 |
| 32 3 1 | 37 24 1 | 8 28 3 |
| 32 6 1 | 37 26 1 | 8 29 3 |
| 32 7 1 | 37 27 1 | 8 31 3 |
| 32 25 1 | 37 30 1 | 8 32 3 |
| 32 26 1 | 37 31 1 | 9 3 3 |
| 32 28 1 | 37 50 2 | 9 6 3 |
| 32 29 1 | 37 53 2 | 9 7 3 |
| 32 32 1 | 37 54 2 | 9 8 3 |
| 32 33 1 | 37 55 2 | 43 54 2 |
| 33 3 1 | 37 56 2 | 43 55 2 |
| 33 4 1 | 38 23 1 | 21 57 2 |
| 33 5 1 | 38 29 1 | 22 50 2 |
| 33 7 1 | 38 30 1 | 22 51 2 |
| 33 8 1 | 36 33 1 | 22 52 2 |
| 33 9 1 | 36 34 1 | 22 53 2 |
| 33 26 1 | 36 35 1 | 23 53 2 |
| 33 27 1 | 38 31 1 | 23 54 2 |
| 33 30 1 | 38 33 1 | 23 55 2 |
| 33 31 1 | 38 34 1 | 23 56 2 |
| 33 33 1 | 38 53 2 | 24 50 2 |
| 34 5 1 | 38 54 2 | |
| 34 6 1 | 38 55 2 | |
| 34 7 1 | 39 21 1 | |
| 34 28 1 | 39 26 1 | |
| 34 29 1 | 39 27 1 | |
| 35 27 1 | 39 28 1 | |
| 35 30 1 | 39 29 1 | |
| 35 31 1 | 41 49 2 | |
| 35 33 1 | 41 52 2 | |
| 35 53 2 | 41 55 2 | |
| 36 3 1 | 42 32 1 | |
| 36 4 1 | 42 54 2 | |
| 36 5 1 | 42 55 2 | |
| 36 25 1 | 30 31 1 | |
| 36 26 1 | 30 32 1 | |
| 36 27 1 | 30 33 1 | |
| 17 56 2 | 30 35 1 | |
| 17 57 2 | 31 1 1 | |
| 18 31 3 | 31 2 1 | |
| 18 49 2 | 42 33 1 | |
| 36 29 1 | 42 34 1 | |
| 36 30 1 | 42 50 2 | |
| 36 31 1 | 42 53 2 | |
| 36 52 2 | 31 3 1 | |
| 36 53 2 | 31 5 1 | |
| | 43 49 2 | |

Printing Iteration 1 and k = 4

```

.....
.....AD.....
.....C.....
...B.DCADA.....
...DBB.B.....
...D.B.B.....
..CDDC..CBC.....AA.CA.....
..A.BDCCDCA.....C.BDBBB.....
..CABB.B.....B...A.ABA.BA.....
...C..BAAD.....B..BD.C.CDADDA.....
..AB.B.CD.C.....B..C.DC.CA.CB.BA.....
...CC.D.A..C.....AC...B..BBBCB.....
...AB.CC..BC.....C.A.D.B.....BBC.....
...BD.DA.....C.D.A.C.DA.....
.....A.....AAACCA.BA.....AAC..CBB...
...DD...CD.....B.B.BA.DA.....DBB.....
.....A...C.BA.DA.....BBD.....
.....C...B.A.....CCCB.BCA..
.....D.....A...BCBD...
.....D.CADCAC.ACC...
.....DACA.....
.....DDB...CBA..
.....CADA.....
.....CADC.....
.....BDCB.....
.....BDD.....
..BBC..CA.....CCA.....
...B.DCBC.....
...D.AD.CCCA.....BC.....
..BC.BACD.....AC.AB..A.....
..AADB.B..AB.....DC...CDC.A.....
..BAC.DD..DD.....CA.DB..DA.....
..BC..CC.....CD.DA..AC.....
...BBD.CCB.....AC..BD.C.....
...ADB.....CDC.A..C.....
..CCD.....AA..CB.D.....C.....
...CAA.....ACA.CDD.CAB.....CACD.....
.....C.BB..DB.....D..CBBC...
.....B.....BDC.ADD.....B..CBBCB...
.....C...BCBABD.AAB.....BAA..BDAB..
.....D.....B..CCBB.....
.....AA.CCD.....D.A..C..CCCC.
.....BBD.BDD.....D..DDDA...
.....AA..DC.....D..BDDC...
.....

```


Printing Iteration 3 and k = 4

```

.....
.....DD.....
.....D.....
....D.DDDDD.....
....DDD.D.....
....D.D.D.....
..A.D.D.D.....DD.DD.....
..A.AAAAADD.....D.DDDDD.....
..AAAA.A.....D.....D.DDD.DD.....
..A..AAAA.....D..DD.D.DDDDDDB.....
..AA.A.AA.A.....D..D.DD.DD.BB.BB.....
....AA.A.A.D.....DD...D..DDBBB.....
....AA.AA..AA.....D.D.D.B.....BBB.....
....AA.AA.....D.D.D.D.BB.....
.....A.....DDDDDB.BB.....BBB..BBB...
....AA..AA.....D.D.BB.BB.....BBB.....
.....D...B.BB.BB.....BBB.....
.....D...B.B.....BBBB.BBB...
.....B.....B...BBBB...
.....B.BBBBBB.BBB...
.....BBBB.....
.....BBB...BBB...
.....BBBB.....
.....BBB.....
.....BBB.....
.....BBB.....
..CCC..CC.....BBB.....
..C.CCCC.....
...C.CC.CCCC.....BB.....
..CC.CCCC.....BB.BB..B.....
..CCCC.C..CC.....BB...BBB.B.....
.CCC.CC..CC.....BB.BB..BB.....
..CC..CC.....BB.BB..BB.....
...CCC.CCC.....BB..BB.B.....
....CCC.....BBB.B..B.....
.CCC.....BB..BB.B.....B.....
...CCC.....BBB.BBB.BBB.....BBBB.....
.....B.BB..BB.....B..BBBB...
.....B.....BBB.BBB.....B..BBBBB...
.....B...BBBBBB.BBB.....BBB..BBBB...
.....B.....B..BBBB...
.....BB.BBB.....B.B..B..BBBB...
.....BBB.BBB.....B..BBBB...
.....BB..BB.....B..BBBB...
.....

```


| | | |
|---------|---------|---------|
| 45 60 | 5 7 4 | 9 30 4 |
| 399 | 6 2 1 | 9 31 4 |
| 41 56 2 | 40 53 2 | 9 32 4 |
| 41 57 2 | 40 54 2 | 10 28 4 |
| 42 29 2 | 7 4 1 | 10 30 4 |
| 42 30 2 | 7 5 1 | 10 31 4 |
| 1 6 4 | 6 4 4 | 10 33 4 |
| 2 4 4 | 6 5 4 | 10 34 4 |
| 3 3 4 | 6 8 4 | 10 36 4 |
| 3 7 4 | 6 9 4 | 10 37 4 |
| 3 8 4 | 6 10 4 | 11 4 1 |
| 34 30 2 | 6 25 4 | 11 5 1 |
| 34 32 2 | 6 29 4 | 11 7 1 |
| 34 35 2 | 7 6 1 | 11 9 1 |
| 35 1 3 | 7 7 1 | 11 12 4 |
| 41 58 2 | 6 26 4 | 11 22 4 |
| 42 28 2 | 6 28 4 | 11 23 4 |
| 35 2 3 | 7 8 1 | 11 33 4 |
| 35 3 3 | 7 9 4 | 11 34 4 |
| 35 26 2 | 7 10 4 | 12 3 1 |
| 3 9 4 | 16 53 2 | 12 4 1 |
| 6 3 4 | 16 54 2 | 12 6 1 |
| 7 2 1 | 17 22 4 | 12 7 1 |
| 4 4 4 | 17 26 4 | 12 10 1 |
| 1 7 4 | 8 20 4 | 12 11 1 |
| 4 5 4 | 8 25 4 | 12 25 4 |
| 39 51 2 | 8 27 4 | 12 27 4 |
| 39 54 2 | 9 9 1 | 12 29 4 |
| 39 55 2 | 9 21 4 | 12 31 4 |
| 39 56 2 | 11 27 4 | 12 51 2 |
| 39 57 2 | 11 30 4 | 12 52 2 |
| 40 32 2 | 11 31 4 | 12 53 2 |
| 40 48 2 | 11 32 4 | 13 5 1 |
| 20 53 2 | 9 24 4 | 13 6 1 |
| 20 54 2 | 9 25 4 | 13 8 1 |
| 21 48 2 | 9 33 4 | 13 9 1 |
| 21 49 2 | 9 34 4 | 13 24 4 |
| 40 51 2 | 10 2 1 | 17 28 4 |
| 40 52 2 | 10 3 1 | 17 50 2 |
| 41 26 2 | 10 5 1 | 8 7 1 |
| 41 27 2 | 10 7 1 | 13 32 4 |
| 41 29 2 | 10 8 1 | 13 33 4 |
| 4 6 4 | 10 10 1 | 14 7 1 |
| 4 8 4 | 10 22 4 | 14 25 4 |
| 5 3 4 | 10 25 4 | 14 26 4 |
| 5 5 4 | 10 27 4 | 14 27 4 |
| 3 5 4 | 9 27 4 | 14 28 4 |
| 3 6 4 | 9 29 4 | 14 29 4 |

| | | |
|---------|---------|---------|
| 14 30 4 | 17 53 2 | 41 31 2 |
| 7 24 4 | 17 55 2 | 41 47 2 |
| 7 26 4 | 39 34 2 | 28 4 3 |
| 7 27 4 | 39 35 2 | 28 6 3 |
| 7 28 4 | 39 49 2 | 28 7 3 |
| 14 32 4 | 39 50 2 | 28 9 3 |
| 14 33 4 | 18 53 2 | 28 10 3 |
| 14 49 2 | 18 54 2 | 28 11 3 |
| 14 50 2 | 18 55 2 | 28 12 3 |
| 14 51 2 | 18 56 2 | 28 29 2 |
| 14 54 2 | 19 45 2 | 28 30 2 |
| 14 55 2 | 19 47 2 | 29 2 3 |
| 14 56 2 | 19 48 2 | 29 3 3 |
| 15 4 1 | 19 49 2 | 29 5 3 |
| 15 5 1 | 19 50 2 | 29 6 3 |
| 15 9 1 | 19 51 2 | 29 7 3 |
| 15 10 1 | 19 52 2 | 29 8 3 |
| 15 24 4 | 19 54 2 | 29 29 2 |
| 15 26 4 | 19 55 2 | 29 30 2 |
| 15 28 4 | 19 56 2 | 29 32 2 |
| 15 29 4 | 20 51 2 | 29 33 2 |
| 15 31 4 | 20 52 2 | 29 36 2 |
| 15 32 4 | 21 50 2 | 30 2 3 |
| 15 51 2 | 21 55 2 | 30 3 3 |
| 15 52 2 | 21 56 2 | 30 4 3 |
| 15 53 2 | 24 51 2 | 30 5 3 |
| 16 23 4 | 24 52 2 | 30 7 3 |
| 16 27 4 | 24 53 2 | 30 10 3 |
| 16 29 4 | 25 55 2 | 30 11 3 |
| 16 30 4 | 25 56 2 | 30 26 2 |
| 42 56 2 | 25 57 2 | 30 27 2 |
| 43 26 2 | 26 2 3 | 38 35 2 |
| 43 27 2 | 26 3 3 | 38 48 2 |
| 7 29 4 | 26 4 3 | 38 51 2 |
| 7 30 4 | 26 7 3 | 38 52 2 |
| 8 2 1 | 26 8 3 | 31 6 3 |
| 8 3 1 | 26 52 2 | 31 9 3 |
| 8 4 1 | 26 53 2 | 31 10 3 |
| 8 5 1 | 26 54 2 | 31 26 2 |
| 43 30 2 | 27 3 3 | 31 27 2 |
| 43 31 2 | 27 5 3 | 31 29 2 |
| 16 32 4 | 27 6 3 | 31 30 2 |
| 16 33 4 | 27 7 3 | 31 33 2 |
| 16 52 2 | 27 8 3 | 31 34 2 |
| 13 26 4 | 39 30 2 | 32 2 3 |
| 13 28 4 | 39 31 2 | 32 3 3 |
| 13 30 4 | 39 33 2 | 32 6 3 |
| 17 51 2 | 41 30 2 | 32 7 3 |
| 17 52 2 | | |

| | | |
|---------|---------|---------|
| 32 25 2 | 37 50 2 | 9 6 1 |
| 32 26 2 | 37 53 2 | 9 7 1 |
| 32 28 2 | 37 54 2 | 9 8 1 |
| 32 29 2 | 37 55 2 | 43 54 2 |
| 32 32 2 | 37 56 2 | 43 55 2 |
| 32 33 2 | 38 23 2 | 21 57 2 |
| 33 3 3 | 38 29 2 | 22 50 2 |
| 33 4 3 | 38 30 2 | 22 51 2 |
| 33 5 3 | 36 33 2 | 22 52 2 |
| 33 7 3 | 36 34 2 | 22 53 2 |
| 33 8 3 | 36 35 2 | 23 53 2 |
| 33 9 3 | 38 31 2 | 23 54 2 |
| 33 26 2 | 38 33 2 | 23 55 2 |
| 33 27 2 | 38 34 2 | 23 56 2 |
| 33 30 2 | 38 53 2 | 24 50 2 |
| 33 31 2 | 38 54 2 | |
| 33 33 2 | 38 55 2 | |
| 34 5 3 | 39 21 2 | |
| 34 6 3 | 39 26 2 | |
| 34 7 3 | 39 27 2 | |
| 34 28 2 | 39 28 2 | |
| 34 29 2 | 39 29 2 | |
| 35 27 2 | 41 49 2 | |
| 35 30 2 | 41 52 2 | |
| 35 31 2 | 41 55 2 | |
| 35 33 2 | 42 32 2 | |
| 35 53 2 | 42 54 2 | |
| 36 3 3 | 42 55 2 | |
| 36 4 3 | 30 31 2 | |
| 36 5 3 | 30 32 2 | |
| 36 25 2 | 30 33 2 | |
| 36 26 2 | 30 35 2 | |
| 36 27 2 | 31 1 3 | |
| 17 56 2 | 31 2 3 | |
| 17 57 2 | 42 33 2 | |
| 18 31 4 | 42 34 2 | |
| 18 49 2 | 42 50 2 | |
| 36 29 2 | 42 53 2 | |
| 36 30 2 | 31 3 3 | |
| 36 31 2 | 31 5 3 | |
| 36 52 2 | 43 49 2 | |
| 36 53 2 | 43 52 2 | |
| 36 54 2 | 43 53 2 | |
| 36 55 2 | 8 28 4 | |
| 37 24 2 | 8 29 4 | |
| 37 26 2 | 8 31 4 | |
| 37 27 2 | 8 32 4 | |
| 37 30 2 | 9 3 1 | |
| 37 31 2 | | |

Printing Iteration 1 and k = 5

```

.....
.....AA.....
.....E.....
...C.DDEBA.....
...ADD.B.....
...C.D.A.....
..CCCB..BED.....AB.BC.....
..D.AAABBAE.....B.ADAAD.....
..CEBD.C.....C.....B.CAC.BE.....
...E..AEEE.....B..DD.E.BBCCAC.....
..AC.C.EB.E.....B..D.CA.CA.AD.EA.....
...AE.E.A..C.....EE...B..EDECC.....
...AD.EB..AA.....B.E.B.D.....ACC.....
...CA.AD.....A.B.C.D.ED.....
.....A.....CEAABE.CA.....CBE..AAB...
...DD...AA.....E.C.DE.ED.....CAB.....
.....A...A.BC.CC.....BCD.....
.....E...D.A.....DDDB.CAD...
.....C.....A...BDBC...
.....D.EAACCA.BBC...
.....CDBC...
.....EEA...BED...
.....ADDB.....
.....CDEA...
.....EDDC.....
.....BCD...
...DDD..DA.....ACE.....
...A.BBAD.....
...B.EA.DCAA.....AC.....
...CE.DEDE.....CD.BB..A.....
...EDAA.B..BA.....EE...ABA.A.....
..CEA.AC..BE.....DB.CA..DA.....
..ED..AD.....EC.CA..BB.....
...ECA.BEA.....DB..AD.E.....
...ADA.....DAE.D..A.....
..DDE.....DE..CA.A.....E.....
...AAE.....EBD.DAC.EBD.....DBCC...
.....A.BC..CC.....C..ECBC...
.....A.....ECD.DEE.....A..DBABA...
.....C...EADBBC.BEB.....ADB..BECA..
.....B.....B..EAAE.....
.....AC.DCC.....E.D..E..BADD.
.....BDC.DAA.....E..DBDE...
.....DD..EA.....D..BEAA...
.....

```

Printing Iteration 2 and k = 5

```

.....
.....BB.....
....B.....
...B.BBBBB.....
...BBB.B.....
...B.B.B.....
..BBBB..BBB.....DD.CC.....
..B.BBBBBBB.....D.DCCCC.....
..BBBB.B.....D...D.CCC.CC.....
...B..BBBB.....D..DD.C.CCCCC.....
..BB.B.BB.B.....D..C.CC.CC.CC.CC.....
...BB.B.B..B.....DD...C..CCCC.....
...BB.BB..BB.....C.C.C.C.....CCC.....
.....BB.BB.....C.C.C.C.CC.....
.....B.....CCCCC.CC.....CCC..CCC...
...BB..BB.....C.C.CC.CC.....CCC.....
.....C...C.CC.CC.....CCC.....
.....C...C.C.....CCCC.CCC...
.....C.....C...CCCC...
.....C.CCCCC.CCC...
.....CCCC
.....AAA...AAA...
.....AAAA.....
.....AAAA...
.....AAAA...
.....AAA...
..EEE..EE.....AAA.....
...E.EEEE.....
...E.EE.EEEE.....AA.....
..EE.EEEE.....AA.AA..A.....
..EEEE.E..EE.....AA...AAA.A.....
.EEE.EE..EE.....AA.AA..AA.....
..EE..EE.....AA.AA..AA.....
...EEE.EEE.....AA..AA.A.....
....EEE.....AAA.A..A.....
.EEE.....AA..AA.A.....A.....
...EEE.....AAA.AAA.AAA.....AAAA...
.....A.AA..AA.....A..AAAA...
.....A.....AAA.AAA.....A..AAAAA...
.....A...AAAAA.AAA.....AAA..AAAA...
.....A.....A.....A..AAAA...
.....AA.AAA.....A.A..A..AAAA...
.....AAA.AAA.....A..AAAA...
.....AA..AA.....A..AAAA...
.....

```

Printing Iteration 3 and k = 5

```

.....
.....BB.....
....B.....
...B.BBBB.....
...BBB.B.....
...B.B.B.....
..BBBB..BBB.....DD.CC.....
..B.BBBBBBB.....D.DCCCC.....
..BBBB.B.....D...D.CCC.CC.....
...B..BBBB.....D..DD.C.CCCCC.....
..BB.B.BB.B.....D..D.CC.CC.CC.CC.....
...BB.B.B..B.....DD...C..CCCC.....
...BB.BB..BB.....D.C.C.C.....CCC.....
.....BB.BB.....D.D.C.C.CC.....
.....B.....DDCCCC.CC.....CCC..CCC...
...BB..BB.....D.D.CC.CC.....CCC.....
.....D...C.CC.CC.....CCC.....
.....D...D.C.....CCCC.CCC...
.....C.....C...CCCC...
.....C.CCCCC.CCC...
.....CCCC.....
.....CCC...CCC...
.....CCCC.....
.....AAAA.....
.....AAAA.....
.....AAA.....
..EEE..EE.....AAA.....
...E.EEEE.....
...E.EE.EEEE.....AA.....
..EE.EEEE.....AA.AA..A.....
..EEEE.E..EE.....AA...AAA.A.....
.EEE.EE..EE.....AA.AA..AA.....
..EE..EE.....AA.AA..AA.....
...EEE.EEE.....AA..AA.A.....
....EEE.....AAA.A..A.....
.EEE.....AA..AA.A.....A.....
...EEE.....AAA.AAA.AAA.....AAAA.....
.....A.AA..AA.....A..AAAA.....
.....A.....AAA.AAA.....A..AAAA.....
.....A...AAAAA.AAA.....AAA..AAAA.....
.....A.....A..AAAA.....
.....AA.AAA.....A.A..A..AAAA.....
.....AAA.AAA.....A..AAAA.....
.....AA..AA.....A..AAAA.....
.....

```

Printing Iteration 4 and k = 5

```

.....
.....BB.....
....B.....
...B.BBBB.....
...BBB.B.....
...B.B.B.....
..BBBB..BBB.....DD.CC.....
..B.BBBBBBB.....D.DCCCC.....
..BBBB.B.....D...D.CCC.CC.....
...B..BBBB.....D..DD.C.CCCCC.....
..BB.B.BB.B.....D..D.CC.CC.CC.CC.....
...BB.B.B..B.....DD...D..CCCC.....
...BB.BB..BB.....D.D.C.C.....CCC.....
.....BB.BB.....D.D.D.C.CC.....
.....B.....DDDDDC.CC.....CCC..CCC..
...BB..BB.....D.D.DD.CC.....CCC.....
.....D...D.DD.CC.....CCC.....
.....D...D.D.....CCCC.CCC..
.....D.....C...CCCC..
.....C.CCCCC.CCC..
.....CCCC.....
.....CCC...CCC..
.....CCCC.....
.....CCCC.....
.....CCCC.....
.....CCC.....
...EEE..EE.....ACC.....
...E.EEEE.....
...E.EE.EEEE.....AA.....
...EE.EEEE.....AA.AA..A.....
...EEEE.E..EE.....AA...AAA.A.....
...EEE.EE..EE.....AA.AA..AA.....
...EE..EE.....AA.AA..AA.....
...EEE.EEE.....AA..AA.A.....
....EEE.....AAA.A..A.....
...EEE.....AA..AA.A.....A.....
...EEE.....AAA.AAA.AAA.....AAAA.....
.....A.AA..AA.....A..AAAA.....
.....A.....AAA.AAA.....A..AAAA.....
.....A...AAAAA.AAA.....AAA..AAAA.....
.....A.....A.....A..AAAA.....
.....AA.AAA.....A.A..A..AAAA.....
.....AAA.AAA.....A..AAAA.....
.....AA..AA.....A..AAAA.....
.....

```


Printing Iteration 5 and k = 5

```

.....
.....BB.....
....B.....
...B.BBBBB.....
...BBB.B.....
...B.B.B.....
..BBBB..BBB.....DD.CC.....
..B.BBBBBBB.....D.DCCCC.....
..BBBB.B.....D...D.CCC.CC.....
...B..BBBB.....D..DD.C.CCCCCC.....
..BB.B.BB.B.....D..D.CC.CC.CC.CC.....
...BB.B.B..B.....DD...D..CCCCC.....
...BB.BB..BB.....D.D.D.C.....CCC.....
.....BB.BB.....D.D.D.D.DC.....
.....B.....DDDDDD.DD.....CCC..CCC..
...BB..BB.....D.D.DD.DD.....CCC.....
.....D...D.DD.DD.....CCC.....
.....D...D.D.....CCCC.CCC..
.....D.....C...CCCC..
.....C.CCCCCC.CCC..
.....CCCC.....
.....CCC...CCC..
.....CCCC.....
.....CCCC.....
.....CCCC.....
.....CCC.....
...EEE..EE.....CCC.....
...E.EEEE.....
...E.EE.EEEE.....AA.....
...EE.EEEE.....AA.AA..A.....
...EEEE.E..EE.....AA...AAA.A.....
...EEE.EE..EE.....AA.AA..AA.....
...EE..EE.....AA.AA..AA.....
...EEE.EEE.....AA..AA.A.....
....EEE.....AAA.A..A.....
...EEE.....AA..AA.A.....A.....
...EEE.....AAA.AAA.AAA.....AAAA.....
.....A.AA..AA.....A..AAAA.....
.....A.....AAA.AAA.....A..AAAA.....
.....A...AAAAA.AAA.....AAA..AAAA.....
.....A.....A.....A..AAAA.....
.....AA.AAA.....A.A..A..AAAA.....
.....AAA.AAA.....A..AAAA.....
.....AA..AA.....A..AAAA.....
.....

```

Printing Iteration 6 and k = 5

```

.....
.....BB.....
....B.....
...B.BBBBB.....
...BBB.B.....
...B.B.B.....
..BBBB..BBB.....DD.CC.....
..B.BBBBBBB.....D.DCCCC.....
..BBBB.B.....D...D.CCC.CC.....
...B..BBBB.....D..DD.C.CCCCC.....
..BB.B.BB.B.....D..D.CC.CC.CC.CC.....
...BB.B.B..B.....DD...D..DCCCC.....
...BB.BB..BB.....D.D.D.D.....CCC.....
.....BB.BB.....D.D.D.D.DD.....
.....B.....DDDDDD.DD.....CCC..CCC..
...BB..BB.....D.D.DD.DD.....CCC.....
.....D...D.DD.DD.....CCC.....
.....D...D.D.....CCCC.CCC..
.....D.....C...CCCC..
.....C.CCCCC.CCC..
.....CCCC.....
.....CCC...CCC..
.....CCCC.....
.....CCCC.....
.....CCCC.....
.....CCC.....
...EEE..EE.....CCC.....
...E.EEEE.....
...E.EE.EEEE.....AA.....
...EE.EEEE.....AA.AA..A.....
...EEEE.E..EE.....AA...AAA.A.....
...EEE.EE..EE.....AA.AA..AA.....
...EE..EE.....AA.AA..AA.....
...EEE.EEE.....AA..AA.A.....
....EEE.....AAA.A..A.....
...EEE.....AA..AA.A.....A.....
...EEE.....AAA.AAA.AAA.....AAAA.....
.....A.AA..AA.....A..AAAA.....
.....A.....AAA.AAA.....A..AAAA.....
.....A...AAAAA.AAA.....AAA..AAAA.....
.....A.....A.....A..AAAA.....
.....AA.AAA.....A.A..A..AAAA.....
.....AAA.AAA.....A..AAAA.....
.....AA..AA.....A..AAAA.....
.....

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| | | |
|---------|---------|---------|
| 45 60 | 40 53 1 | 9 32 3 |
| 399 | 40 54 1 | 10 28 3 |
| 41 56 1 | 7 4 2 | 10 30 3 |
| 41 57 1 | 7 5 2 | 10 31 3 |
| 42 29 1 | 6 4 2 | 10 33 3 |
| 42 30 1 | 6 5 2 | 10 34 3 |
| 1 6 2 | 6 8 2 | 10 36 3 |
| 2 4 2 | 6 9 2 | 10 37 3 |
| 3 3 2 | 6 10 2 | 11 4 2 |
| 3 7 2 | 6 25 4 | 11 5 2 |
| 3 8 2 | 6 29 3 | 11 7 2 |
| 34 30 1 | 7 6 2 | 11 9 2 |
| 34 32 1 | 7 7 2 | 11 12 2 |
| 34 35 1 | 6 26 4 | 11 22 4 |
| 35 1 5 | 6 28 3 | 11 23 4 |
| 41 58 1 | 7 8 2 | 11 33 3 |
| 42 28 1 | 7 9 2 | 11 34 3 |
| 35 2 5 | 7 10 2 | 12 3 2 |
| 35 3 5 | 16 53 3 | 12 4 2 |
| 35 26 1 | 16 54 3 | 12 6 2 |
| 3 9 2 | 17 22 4 | 12 7 2 |
| 6 3 2 | 17 26 4 | 12 10 2 |
| 7 2 2 | 8 20 4 | 12 11 2 |
| 4 4 2 | 8 25 4 | 12 25 4 |
| 1 7 2 | 8 27 3 | 12 27 4 |
| 4 5 2 | 9 9 2 | 12 29 4 |
| 39 51 1 | 9 21 4 | 12 31 4 |
| 39 54 1 | 11 27 4 | 12 51 3 |
| 39 55 1 | 11 30 4 | 12 52 3 |
| 39 56 1 | 11 31 4 | 12 53 3 |
| 39 57 1 | 11 32 3 | 13 5 2 |
| 40 32 1 | 9 24 4 | 13 6 2 |
| 40 48 1 | 9 25 4 | 13 8 2 |
| 20 53 3 | 9 33 3 | 13 9 2 |
| 20 54 3 | 9 34 3 | 13 24 4 |
| 21 48 3 | 10 2 2 | 17 28 4 |
| 21 49 3 | 10 3 2 | 17 50 3 |
| 40 51 1 | 10 5 2 | 8 7 2 |
| 40 52 1 | 10 7 2 | 13 32 4 |
| 41 26 1 | 10 8 2 | 13 33 4 |
| 41 27 1 | 10 10 2 | 14 7 2 |
| 41 29 1 | 10 22 4 | 14 25 4 |
| 4 6 2 | 10 25 4 | 14 26 4 |
| 4 8 2 | 10 27 3 | 14 27 4 |
| 5 3 2 | 9 27 3 | 14 28 4 |
| 5 5 2 | 9 29 3 | 14 29 4 |
| 3 5 2 | 9 30 3 | 14 30 4 |
| 3 6 2 | 9 31 3 | 7 24 4 |
| 5 7 2 | | |
| 6 2 2 | | |

| | | |
|---------|---------|---------|
| 7 26 4 | 39 34 1 | 28 4 5 |
| 7 27 3 | 39 35 1 | 28 6 5 |
| 7 28 3 | 39 49 1 | 28 7 5 |
| 14 32 4 | 39 50 1 | 28 9 5 |
| 14 33 4 | 18 53 3 | 28 10 5 |
| 14 49 3 | 18 54 3 | 28 11 5 |
| 14 50 3 | 18 55 3 | 28 12 5 |
| 14 51 3 | 18 56 3 | 28 29 1 |
| 14 54 3 | 19 45 3 | 28 30 1 |
| 14 55 3 | 19 47 3 | 29 2 5 |
| 14 56 3 | 19 48 3 | 29 3 5 |
| 15 4 2 | 19 49 3 | 29 5 5 |
| 15 5 2 | 19 50 3 | 29 6 5 |
| 15 9 2 | 19 51 3 | 29 7 5 |
| 15 10 2 | 19 52 3 | 29 8 5 |
| 15 24 4 | 19 54 3 | 29 29 1 |
| 15 26 4 | 19 55 3 | 29 30 1 |
| 15 28 4 | 19 56 3 | 29 32 1 |
| 15 29 4 | 20 51 3 | 29 33 1 |
| 15 31 4 | 20 52 3 | 29 36 1 |
| 15 32 4 | 21 50 3 | 30 2 5 |
| 15 51 3 | 21 55 3 | 30 3 5 |
| 15 52 3 | 21 56 3 | 30 4 5 |
| 15 53 3 | 24 51 3 | 30 5 5 |
| 16 23 4 | 24 52 3 | 30 7 5 |
| 16 27 4 | 24 53 3 | 30 10 5 |
| 16 29 4 | 25 55 3 | 30 11 5 |
| 16 30 4 | 25 56 3 | 30 26 1 |
| 42 56 1 | 25 57 3 | 30 27 1 |
| 43 26 1 | 26 2 5 | 38 35 1 |
| 43 27 1 | 26 3 5 | 38 48 1 |
| 7 29 3 | 26 4 5 | 38 51 1 |
| 7 30 3 | 26 7 5 | 38 52 1 |
| 8 2 2 | 26 8 5 | 31 6 5 |
| 8 3 2 | 26 52 3 | 31 9 5 |
| 8 4 2 | 26 53 3 | 31 10 5 |
| 8 5 2 | 26 54 3 | 31 26 1 |
| 43 30 1 | 27 3 5 | 31 27 1 |
| 43 31 1 | 27 5 5 | 31 29 1 |
| 16 32 4 | 27 6 5 | 31 30 1 |
| 16 33 4 | 27 7 5 | 31 33 1 |
| 16 52 3 | 27 8 5 | 31 34 1 |
| 13 26 4 | 39 30 1 | 32 2 5 |
| 13 28 4 | 39 31 1 | 32 3 5 |
| 13 30 4 | 39 33 1 | 32 6 5 |
| 17 51 3 | 41 30 1 | 32 7 5 |
| 17 52 3 | 41 31 1 | 32 25 1 |
| 17 53 3 | 41 47 1 | |
| 17 55 3 | | |

| | | |
|---------|---------|---------|
| 32 26 1 | 37 50 1 | 9 6 2 |
| 32 28 1 | 37 53 1 | 9 7 2 |
| 32 29 1 | 37 54 1 | 9 8 2 |
| 32 32 1 | 37 55 1 | 43 54 1 |
| 32 33 1 | 37 56 1 | 43 55 1 |
| 33 3 5 | 38 23 1 | 21 57 3 |
| 33 4 5 | 38 29 1 | 22 50 3 |
| 33 5 5 | 38 30 1 | 22 51 3 |
| 33 7 5 | 36 33 1 | 22 52 3 |
| 33 8 5 | 36 34 1 | 22 53 3 |
| 33 9 5 | 36 35 1 | 23 53 3 |
| 33 26 1 | 38 31 1 | 23 54 3 |
| 33 27 1 | 38 33 1 | 23 55 3 |
| 33 30 1 | 38 34 1 | 23 56 3 |
| 33 31 1 | 38 53 1 | 24 50 3 |
| 33 33 1 | 38 54 1 | |
| 34 5 5 | 38 55 1 | |
| 34 6 5 | 39 21 1 | |
| 34 7 5 | 39 26 1 | |
| 34 28 1 | 39 27 1 | |
| 34 29 1 | 39 28 1 | |
| 35 27 1 | 39 29 1 | |
| 35 30 1 | 41 49 1 | |
| 35 31 1 | 41 52 1 | |
| 35 33 1 | 41 55 1 | |
| 35 53 1 | 42 32 1 | |
| 36 3 5 | 42 54 1 | |
| 36 4 5 | 42 55 1 | |
| 36 5 5 | 30 31 1 | |
| 36 25 1 | 30 32 1 | |
| 36 26 1 | 30 33 1 | |
| 36 27 1 | 30 35 1 | |
| 17 56 3 | 31 1 5 | |
| 17 57 3 | 31 2 5 | |
| 18 31 4 | 42 33 1 | |
| 18 49 3 | 42 34 1 | |
| 36 29 1 | 42 50 1 | |
| 36 30 1 | 42 53 1 | |
| 36 31 1 | 31 3 5 | |
| 36 52 1 | 31 5 5 | |
| 36 53 1 | 43 49 1 | |
| 36 54 1 | 43 52 1 | |
| 36 55 1 | 43 53 1 | |
| 37 24 1 | 8 28 3 | |
| 37 26 1 | 8 29 3 | |
| 37 27 1 | 8 31 3 | |
| 37 30 1 | 8 32 3 | |
| 37 31 1 | 9 3 2 | |

