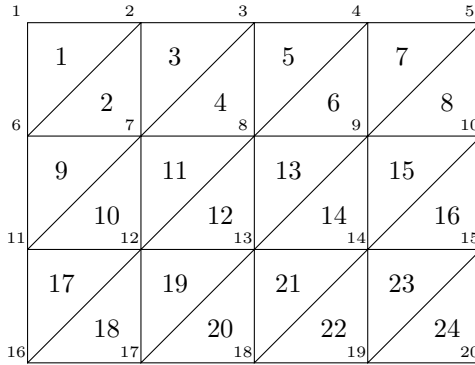


**Programming Exercise 1 (inspired by Alberty/Carstensen/Funken: Remarks around 50 lines of Matlab: short finite element implementation).**  
 Consider the triangulation below for width  $m = 4$  and height  $n = 3$ :



Write an octave program **grid(m,n)**, that generates files containing the coordinates of the nodes, the indices of the triangles and the indices of the edges for which we want to impose dirichlet boundary conditions. For the example above the files should look like the ones below. You may use the octave-functions `save('foo.dat', 'foo')` to save the vector `foo` to a file, `mod(m,n)` and `idivide(m,n)`.

*coordinates.dat.*

```
. # Created by Octave 3.8.1, Mon Nov 10 13:52:38 2014 CET <benjamin@benjamin-
laptop>
# name: coordinates
# type: matrix
# rows: 20
# columns: 3
1 1 1
2 2 1
3 3 1
4 4 1
5 5 1
6 1 2
7 2 2
8 3 2
9 4 2
10 5 2
11 1 3
12 2 3
13 3 3
14 4 3
15 5 3
16 1 4
17 2 4
18 3 4
19 4 4
```

20 5 4

*elements3.dat.*

```
. # Created by Octave 3.8.1, Mon Nov 10 13:52:38 2014 CET <benjamin@benjamin-  
laptop>
```

```
# name: elements3  
# type: matrix  
# rows: 24  
# columns: 4  
1 1 6 2  
2 2 6 7  
3 2 7 3  
4 3 7 8  
5 3 8 4  
6 4 8 9  
7 4 9 5  
8 5 9 10  
9 6 11 7  
10 7 11 12  
11 7 12 8  
12 8 12 13  
13 8 13 9  
14 9 13 14  
15 9 14 10  
16 10 14 15  
17 11 16 12  
18 12 16 17  
19 12 17 13  
20 13 17 18  
21 13 18 14  
22 14 18 19  
23 14 19 15  
24 15 19 20
```

*dirichlet.dat.*

```
. # Created by Octave 3.8.1, Mon Nov 10 13:52:38 2014 CET <benjamin@benjamin-  
laptop>
```

```
# name: dirichlet  
# type: matrix  
# rows: 14  
# columns: 3  
1 1 2  
2 2 3  
3 3 4  
4 4 5  
5 5 10  
6 10 15  
7 15 20
```

8 20 19  
9 19 18  
10 18 17  
11 17 16  
12 16 11  
13 11 6  
14 6 1