CIS*6020 Project 2 Results

Part 1

Example 1

```
[[3], [3], [1, 1], [3], [1, 1]]
[[3], [1], [2, 2], [2], [3]]
..EEE
..EEE
E...E
EEE..
E.E..
Time taken: 0.0003 seconds
```

Example 2

```
[[2], [2], [2], [2, 2], [3]]
[[2], [3], [1], [2, 2], [2, 1]]
...EE
...EE
EE...
EE.EE
.EEE.
Time taken: 0.0002 seconds
```

Example 3

```
[[2], [2, 1], [1, 1], [3], [1, 1], [1, 1], [2], [1, 1], [1, 2],
[[2, 1], [2, 1, 3], [7], [1, 3], [2, 1]]
.EE..
.EE.E
..E.E
.EEE.
```

```
E.E..
E.E..
..EE.
.E.E.
.E.EE
EE...
Time taken: 0.0008 seconds
```

Example 4

```
[[1, 2], [2], [1], [1], [2], [2, 4], [2, 6], [8], [1, 1], [2, 2]
[[2], [3], [1], [2, 1], [5], [4], [1, 4, 1], [1, 5], [2, 2], [2,
......E.EE
........EE
.......E..
.........E
.....EE...
EE..EEEE..
EE.EEEEEE.
.EEEEEEEE.
....E..E..
...EE.EE..
Time taken: 0.0014 seconds
```

Example 5

```
[[3], [5], [3, 1], [2, 1], [3, 3, 4], [2, 2, 7], [6, 1, 1], [4,
[[2], [1, 2], [2, 3], [2, 3], [3, 1, 1], [2, 1, 1], [1, 1, 1, 2,
No solution found.
```

Part 2

Image 1 (33*33)

Original Image 1

This is the logo of Swift programming language, when I use the makenonogram.py to convert it, the pattern shows clearly and detailedly when the size is large. I got the nonogram puzzle below.

Puzzle Image 1

```
E.EEEE.EEEEEEEEEEEEEEEEE.E.EEE.E
.EEEE.E...................EEEEE.
EEE.........................EEEE
E............................EEE
.E..............EEE.........EE
E...............E.EE.........EE
EE.......E.........E.E.........E
E.....E..EE.........E..E........E
E....E.EEEEEE.......EEEEE.......E
E....E.EEEEEEE......EEEEE........
E.....EEEEEE.EE.....EEEEEE.......
E........EEEEEEE....EEEEEEE......
E......EEE.EEEEEE...EEE.EEE......
E..........EEEEE.EE.EEEEE.E......
E........EEEEE.EEEEEEEEE.EEE.....
E..........E.EEEEEE.E.EE.EEE.....
E..........EEEEE..EEEE.EEE.E.....
E............EEEE.E..EEEEEE.......
E..EE........EE.E.EEEEEEEEEE.....
```

```
E.EE.EE.......E.EE.EEEEE.EEE.....
E..EEEE..E.........EEEEE.EEE.....
E..E.E....EEEEEEEE.EEEEEEEEE.....
E...E..EEEE.EE.EE.EEEEEEE.EEE....
E....E.EEE..E...EEEEEE....EEE....
E.....EEE.EE.EEEEEEE.EEEEE.EE....
E.......EEEE.EE...EEEE.EE.E..E...
EE.......EEEEEEEE.EEEEE...EEE...E
E...........EE.EEEEEE......EE..EE
EE.............................EE
EEE............................E
EEEE..........................EE
.EEEE.E..................E.E.EE.
E.EEEE.EEEEEEEEEEEEEEEEE.EEEEE.E
```

Text Puzzle 1

```
1 4 18 1 3 1
4 1 5
3 4
1 3
1 3 2
1 1 2 2
2 1 1 1 1
1 1 2 1 1 1
1 1 6 5 1
1 1 7 5
1 6 2 6
1 7 7
1 3 6 3 3
1 5 2 5 1
1 5 9 3
1 1 6 1 2 3
1 5 4 3 1
1 4 1 6
1 2 2 1 10
```

```
1 2 2 1 2 5 3
1 4 1 5 3
1 1 1 8 9
1 1 4 2 2 7 3
1 1 3 1 6 3
1 3 2 7 5 2
1 4 2 4 2 1 1
2 8 5 3 1
1 2 6 2 2
2 2
3 1
4 2
4 1 1 1 2
1 4 18 5 1

1 2 26 1
2 1 1 1 4
3 1 4
2 4 3
2 1 1 1 2
1 2 3 1 1
1 1 1 2 1 1
1 3 1 3 1
1 3 1 4 1
1 7 1 1 2 2 1
1 5 1 2 3 1
1 9 1 3 1
1 2 4 2 3 2 1
1 10 2 4 1
1 4 5 1 3 1
1 7 2 1 2 1
1 1 2 2 4 2 1
1 3 1 1 1 2 1 1
1 2 4 1 6 1
1 1 1 1 1 10 1
1 2 17 3 1
```

```
1 2 7 11 1
1 8 6 1 1 1
1 5 10 2 1
1 6 3 2 2 1
3 8 1
1 5 6 2 2
1 3 7 2 1
2 3 2 2
3 1 1
4 2
5 2 2
1 7 5 1
```

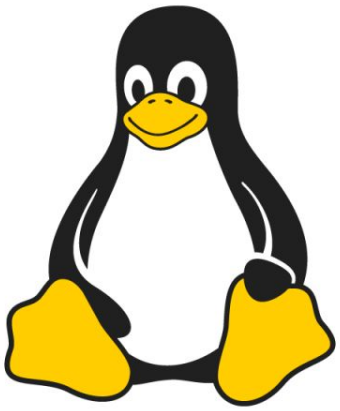
Solver Output

```
E.EEEE.EEEEEEEEEEEEEEEEE.E.EEE.E
.EEEE.E..................EEEEE.
EEE.........................EEEE
E............................EEE
.E..............EEE.........EE
E...............E.EE.........EE
EE.......E.........E.E.........E
E.....E..EE.........E..E........E
E....E.EEEEEE.......EEEEE.......E
E....E.EEEEEEE......EEEEE........
E.....EEEEEE.EE.....EEEEEE.......
E........EEEEEEE....EEEEEEE......
E......EEE.EEEEEE...EEE.EEE......
E..........EEEEE.EE.EEEEE.E......
E........EEEEE.EEEEEEEEE.EEE.....
E..........E.EEEEEE.E.EE.EEE.....
E..........EEEEE..EEEE.EEE.E.....
E...........EEEE.E..EEEEEE.......
E..EE........EE.E.EEEEEEEEEE.....
E.EE.EE.......E.EE.EEEEE.EEE.....
E..EEEE..E.........EEEEE.EEE.....
```

```
E..E.E....EEEEEEEE.EEEEEEEEE.....
E...E..EEEE.EE.EE.EEEEEEE.EEE....
E....E.EEE..E...EEEEEE....EEE....
E.....EEE.EE.EEEEEEE.EEEEE.EE....
E.......EEEE.EE...EEEE.EE.E..E...
EE.......EEEEEEEE.EEEEE...EEE...E
E...........EE.EEEEEE......EE..EE
EE.............................EE
EEE............................E
EEEE..........................EE
.EEEE.E..................E.E.EE.
E.EEEE.EEEEEEEEEEEEEEEEE.EEEEE.E
Time taken: 21.3728 seconds
```

Image 2 (52*52)

Original Image 2



This is a cute Linux penguin, he’s not a big fan of Microsoft.

Puzzle image 2

```
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEE.EEEEEEEEEEEEEEEEEEEEEEEEE
```

```
EEEEEEEEEEEEEEEEEEEE.E.EEE...EEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEE.EE...E.E...EEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEE.EEE.....EE...EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEE..E.E..........EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEE.EE........E.EEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEE...........E.EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.EE.E....EEE.E.E.EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.E.EE.EEEE.EE.EEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.E.EE.E.EE....E.EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.E.EEEEEEE..E....EEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.E.EEEE.E.E.E.EEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.EE.EE.EE..EE.E.EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE...EEE.E.E.EE.EEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.EEEEEE.EEEEE.E.EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.EE....EEE..EEEE..EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE...EEEEEEE..EEEE.EEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEE.EE.E..E....EE...EE.EEEEEEEEEEEE
EEEEEEEEEEEEEEEEE.EE..E.E.EEE..E.E.EE..EEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.....EE.EEE.E..E.EEEEEEEEEEE
EEEEEEEEEEEEEEE.E.EEEE.EEEEEEE.E.EEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEE..EEE..EEEEEEEEE.....EEE..EEEEEEEEEE
EEEEEEEEEEEEEEEE.E.E.EEEEEEEEEEEE.E..E.EEEEEEEEEE
EEEEEEEEEEEEE.EEE.EEEEEEEEEEEEE.E..E.EEEEEEEEEEEE
EEEEEEEEEEEEEEE.E...EEEEEEEEE.E..EE.E...EEEEEEEEE
EEEEEEEEEEE.EEEE...EEEEEEEEEEE..EEEEEE.EEEEEEEEE
EEEEEEEEEEEEEEE.E..EEEEEEEEEE.EEEE..EEEEEEEEEEE
EEEEEEEEEEEEEE.E...EEEEEEEEEEEEE.EEE..E.EEEEEEEE
EEEEEEEEEE.EEEE..EEEEEEEEEEEEEE.EEEEEEE.EEEEEEEE
EEEEEEEEEE....E.EEEEEEEEEEEEEE..EEE.E.EE.EEEEEEEE
EEEEEEEEEE.EEEEEE.EEEEEEEEEEE.EEEE.E..EE.EEEEEEEE
EEEEEEEEE.E.EE..EE.EEEEEEEEEE.E.E..EE.EE.EEEEEEEE
EEEEEEEEE...E.EE..EE.EEEEEEEE.EEEEE.EEEEEE.EEEEEEE
EEEEEEE....EE..EEEEEE.EEEEEEE.EE...EE.E.EE.EEEEEEE
EEEEEEE..E.EE.E...EEE..EEEEEEE.E.EE.E..E.EE.EEEEEEE
EEEEEEEE.EE.EEEE......EEEEEEE.EEEEEE.EEE.EEEEEEEEE
EEEEEE.E...EEEEEE...EE.EEEEEEEE.EEEEEE.EEE.EEEEEEE
```

```
EEEEEEE..EEEEEEEEEE..EE.EEEEEE.EEEEEEEEEE..EE.EEEEEE
EEEEEEEEEE.EEEEEEEEE.EEEEEEEE...E.EEEEEEEEEE.EEEEEE
EEEEEE..E..EEEEEEEE.EE......E...EEEEEEEE.E.EE.EEEEEE
EEEEEE.E.EEEEEEEEEE...EEEE.EEE.EEEEEE......EEEEEEEE
EEEEEE.EE.E...EEEEEEEEEEE...EE.EEEEE..EEE...EEEEEEE
EEEEEE...EEE.E.EEEEEEEE..EEE...E.EEE.E..EE.EEEEEEEEE
EEEEEEE.E..EEEEEEE.........EE.EEEEEEEEE..EEEEEEEEEE
EEEEEEEE..EEEE.E.EEE...E.....E.E.EE.EE...EEEEEEEEEE
EEEEEEEEEEEEE.E.E.E.EE.EEEEEEE.EEEEEE..EEEEEEEEEEE
EEEEEEEEEEEEEEE...E..EEEEEEEEE..EEE..EEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
```

Text Puzzle 2

```
52
52
26 25
22 1 3 21
21 2 1 1 19
20 3 2 18
19 1 1 18
20 2 1 19
22 1 17
18 2 1 3 1 1 17
18 1 2 4 2 20
18 1 2 1 2 1 18
18 1 7 1 17
18 1 4 1 1 1 20
18 2 2 2 2 1 18
18 3 1 1 2 20
18 6 5 1 18
18 2 3 4 16
18 7 4 17
17 2 1 1 2 2 15
```

```
16 2 1 1 3 1 1 2 14
22 2 3 1 1 13
15 1 4 7 1 19
14 3 9 3 12
17 1 1 13 1 1 11
13 3 13 1 1 15
16 1 10 1 2 1 10
12 4 12 7 10
16 1 12 4 13
15 1 15 3 1 9
11 4 15 8 9
11 1 15 3 1 2 9
11 6 12 4 1 2 9
10 1 2 2 11 1 1 2 2 9
9 1 2 2 9 5 6 8
7 2 6 8 2 2 1 2 8
7 1 2 1 3 7 1 2 1 1 2 8
8 2 4 8 6 3 10
6 1 7 2 9 6 3 7
7 10 2 6 10 2 6
10 9 8 1 11 6
6 1 8 2 1 8 1 2 6
6 1 11 4 3 6 8
6 2 1 12 2 5 3 7
6 3 1 8 3 1 3 1 2 9
7 1 7 2 10 10
8 4 1 3 1 1 1 2 2 11
13 1 1 1 2 8 6 12
15 1 10 3 14
52
52
52

52
52
52
```

```
52
52
52
38 2 7
35 2 1 2 6
35 2 1 1 5
34 2 2 1 1 5
33 1 1 3 6
30 1 2 5 8
27 3 1 9 7
25 5 2 6 3 4
23 7 3 8 1 5
22 5 3 2 10 3
20 5 1 1 1 1 8 1 3
19 2 1 1 1 3 1 9 3
9 7 2 4 6 6
6 8 2 1 2 1 3 3 1 3 1 3
5 2 1 2 2 2 7 2 1 2 1 3
4 4 4 2 6 10 4 2 5
3 2 1 8 1 13 4 2 4
7 5 1 1 16 1 2 6
3 4 1 2 19 2 5
4 1 1 2 2 1 19 3 5
2 1 5 3 1 19 1 1 5
5 4 4 21 2 5
3 1 1 1 22 1 5
3 2 2 3 1 18 2 6
3 1 1 10 10 1 2 1 5
4 1 1 2 2 1 5 6 3 3
4 2 6 2 3 2 4 7 1 1 3
5 4 1 1 2 1 1 2 1 1 2 1 11
8 2 4 4 1 8 16
17 3 2 4 3 1 9 5
19 3 6 9 3 3
20 3 1 1 2 4 5 4 3
21 1 3 3 2 5 1 4
```

```
23 2 2 1 8 1 1 4
24 1 2 5 1 2 2 5
26 9 1 2 2 6
29 5 1 7
34 5 8
38 4 8
39 10
52
52
52
52
52
52
```

Solver Output

```
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEE.EEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.E.EEE...EEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE...E.E...EEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EEE.....EE...EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE..E.E.........EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE........E.EEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEE..........E.EEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE.E....EEE.E.E.EEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.E.EE.EEEE.EE.EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.E.EE.E.EE....E.EEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.E.EEEEEEE..E....EEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.E.EEEE.E.E.E.EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE.EE.EE..EE.E.EEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE...EEE.E.E.EE.EEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EEEEEE.EEEEE.E.EEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE....EEE..EEEE..EEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE...EEEEEEE..EEEE.EEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEE.EE.E..E....EE...EE.EEEEEEEEE
```

```
EEEEEEEEEEEEEEE.EE..E.E.EEE..E.E.EE..EEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEE.....EE.EEE.E..E.EEEEEEEEEEEE
EEEEEEEEEEEEEEE.E.EEEE.EEEEEEE.E.EEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEE..EEE..EEEEEEEEE.....EEE..EEEEEEEEEE
EEEEEEEEEEEEEEEE.E.E.EEEEEEEEEEEE.E..E.EEEEEEEEEE
EEEEEEEEEEEEE.EEE.EEEEEEEEEEEE.E..E.EEEEEEEEEEEEE
EEEEEEEEEEEEEEE.E...EEEEEEEEE.E..EE.E...EEEEEEEEE
EEEEEEEEEEE.EEEE...EEEEEEEEEEE..EEEEEE.EEEEEEEEE
EEEEEEEEEEEEEEE.E..EEEEEEEEEE.EEEE..EEEEEEEEEEE
EEEEEEEEEEEEEEE.E...EEEEEEEEEEEEE.EEE..E.EEEEEEEE
EEEEEEEEEE.EEEE..EEEEEEEEEEEEEE.EEEEEEE.EEEEEEEE
EEEEEEEEEE....E.EEEEEEEEEEEEEE..EEE.E.EE.EEEEEEEE
EEEEEEEEEE.EEEEE.EEEEEEEEEEE.EEEE.E..EE.EEEEEEEE
EEEEEEEEE.E.EE..EE.EEEEEEEEE.E.E..EE.EE.EEEEEEEE
EEEEEEEE...E.EE..EE.EEEEEEEE.EEEEE.EEEEE.EEEEEEE
EEEEEE....EE..EEEEE.EEEEEEE.EE...EE.E.EE.EEEEEEE
EEEEEE..E.EE.E...EEE..EEEEEE.E.EE.E..E.EE.EEEEEEE
EEEEEEE.EE.EEEE.....EEEEEEE.EEEEE.EEE.EEEEEEEEE
EEEEEE.E...EEEEEE...EE.EEEEEEE.EEEEE.EEE.EEEEEE
EEEEEE..EEEEEEEEE..EE.EEEEE.EEEEEEEEE..EE.EEEEE
EEEEEEEEE.EEEEEEEE.EEEEEEE...E.EEEEEEEEE.EEEEE
EEEEE..E..EEEEEEE.EE.....E...EEEEEEE.E.EE.EEEEE
EEEEE.E.EEEEEEEEE...EEEE.EEE.EEEEE.....EEEEEEE
EEEEE.EE.E...EEEEEEEEEE...EE.EEEE..EEE...EEEEEE
EEEEE...EEE.E.EEEEEEE..EEE...E.EEE.E..EE.EEEEEEE
EEEEEE.E..EEEEEE........EE.EEEEEEEEE..EEEEEEEEE
EEEEEEE..EEEE.E.EEE...E.....E.E.EE.EE...EEEEEEEEE
EEEEEEEEEEEE.E.E.E.EE.EEEEEEE.EEEEE..EEEEEEEEEEE
EEEEEEEEEEEEE...E..EEEEEEEEE..EEE..EEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
Time taken: 33.9677 seconds
```