Lab 07: elements of corrections

Q1:

```
10 students and 10 projects
   Student_id  Project_01  Project_02  Project_03  Project_04  Project_05  \
0    stud-01          10           6           7           4           2
1    stud-02           7           1          10           9           6
2    stud-03           9           6           8           7           4
3    stud-04           1           9           2          10           5
4    stud-05           8           3           9           2           6

   Project_06  Project_07  Project_08  Project_09  Project_10
0           8           3           1           9           5
1           3           8           4           5           2
2           2           1          10           3           5
3           6           7           3           8           4
4           1           4          10           7           5
```

Q2:

```
3628800 possible solutions
```

Q3:

```
A_arr:
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 10.0, 6.0, 7.0, 4.0, 2.0, 8.0, 3.0, 1.0, 9.0, 5.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 7.0, 1.0, 10.0, 9.0, 6.0, 3.0, 8.0, 4.0, 5.0, 2.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 9.0, 6.0, 8.0, 7.0, 4.0, 2.0, 1.0, 10.0, 3.0, 5.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1.0, 9.0, 2.0, 10.0, 5.0, 6.0, 7.0, 3.0, 8.0, 4.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 8.0, 3.0, 9.0, 2.0, 6.0, 1.0, 4.0, 10.0, 7.0, 5.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 3.0, 7.0, 8.0, 10.0, 5.0, 1.0, 2.0, 6.0, 9.0, 4.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 2.0, 10.0, 5.0, 9.0, 7.0, 3.0, 1.0, 6.0, 4.0, 8.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 10.0, 1.0, 9.0, 3.0, 5.0, 8.0, 7.0, 2.0, 4.0, 6.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 9.0, 1.0, 10.0, 7.0, 3.0, 2.0, 4.0, 5.0, 6.0, 8.0]
[0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 3.0, 8.0, 5.0, 9.0, 7.0, 4.0, 6.0, 10.0, 2.0, 1.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
[0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
```

Q4:

```
[0, 17, 1, 11, 2, 16, 3, 10, 4, 15, 5, 19, 6, 18, 7, 13, 8, 14, 9, 12, 0]
```

Q6:

```
Minimal loss = 17.0 (obtained in 8.0% of the 100 previous trials)
```

Q7:

```
30 students and 10 projects
   Student_id  Project_01  Project_02  Project_03  Project_04  Project_05  \
0    stud-01           3           4           7          10           6
1    stud-02           2           1           5           3          10
2    stud-03           4           3           6           1           9
3    stud-04           4           9           1           2           3
4    stud-05           3           6           4           9           7

   Project_06  Project_07  Project_08  Project_09  Project_10
0           1           8           2           5           9
1           6           8           4           7           9
2           2           5           8           7          10
3           5           8          10           7           6
4           1           2           5           8          10
```

Q8:

```
3 students working on project 1 ('stud-02', 'stud-11', 'stud-12')
3 students working on project 2 ('stud-09', 'stud-10', 'stud-15')
3 students working on project 3 ('stud-18', 'stud-20', 'stud-27')
3 students working on project 4 ('stud-03', 'stud-28', 'stud-30')
3 students working on project 5 ('stud-04', 'stud-07', 'stud-17')
3 students working on project 6 ('stud-01', 'stud-05', 'stud-24')
3 students working on project 7 ('stud-22', 'stud-26', 'stud-29')
3 students working on project 8 ('stud-08', 'stud-14', 'stud-23')
3 students working on project 9 ('stud-06', 'stud-13', 'stud-16')
3 students working on project 10 ('stud-19', 'stud-21', 'stud-25')
Optimized loss value: 37
```