PROJECT 5   deadline:
3/5 Jan 2022

Standard version (4 points)

Simulate on computer 3 tournaments (**A, B, C**) between 7 types of IPD strategies enumerated below

1) Always 'C' (**Cooperator**)
2) Always 'D' (**Defector**)
3) **Tit for Tat** (**starts with 'C' and then repeats the previous move of the opponent**)
4) **Spiteful** (**starts with 'C' and plays 'C' until the opponent plays 'D' – then plays 'D' in each round up to the end of the contest**)
5) **Naive Prober** (**here**: defecting with probability **0.1**) (**plays like TFT, but if TFT would play 'C' then NP plays 'C' with the probability (1 - defection_probability)**)
6) **Tit for 2 Tats** (**plays 'C' in first two moves and plays 'D' only when the opponent has played 'D' in his last two moves**)
7) **Random Player** (**plays 'C' and 'D' with the same probability (0.5)**)

For each tournament consider the corresponding set of contestants:

A) 5 representants of the strategies 1)-6) 30 players
B) 15 x Random Player, 5 x Defector, 3 x TFT, 5 x Cooperator, 2 x Spiteful 30 players
C) 5 x Defector, 20 x TFT, 2 x TF2T, 1 x Spiteful, 1 x Cooperator, 1 x Naive Prober 30 players

Tournament rules: each player plays a contest with each of the other players. A
contest consists of 20 rounds. Each round is a prisoner's dilemma with the payoff matrix specified as below:

I(II)	C	D
C	4(4)	0(5)
D	5(0)	2(2)

The player's score of the contest is the sum of the points obtained in each round.
The player's TOTAL score should be calculated as the sum of points of all the contests.
The final classification of the players should be created on the basis of their total scores (not the number of winning contest!)
For options a),b),c) present the results in a table and formulate the conclusions (stating which strategies are successful, which are not, and explaining why)

	Always C	Always D	TFT	Spiteful	TF2T	Random
Always C	80(80)	0(100)		80(80)		
Always D		40(40)				
TFT						
Spiteful						

TF2T						
Random						

Minimal version **(2 points)**

Consider a situation where 1 representant of each of the strategies 1)-4), 6), 7) takes part in the tournament (the tournament rules described above)

I. Simulate a contest between each pair of players

Below several examples of how contests should be recorded:

```
1)Always 'C' C C C C C  C C C C C C C C C C C C C C C
2) Always 'C' C C C C C  C C C C C C C C C C C C C C C
score of 1)    4 4 4 4 4  4 4 4 4 4  4 4 4 4 4  4 4 4 4 4     → 80
score of 2)    4 4 4 4 4  4 4 4 4 4  4 4 4 4 4  4 4 4 4 4     → 80
```

```
random # for 1)      1 1 1 1 0  1 0 1 1 0  1 1 0 0 1  0 0 0 0 0
1)Random            D D D D C  D C D D C  D D C C D  C C C C C
2) TF2T             C C D D D  C C C C D  C C D C C  C C C C C
score of 1)          5 5 2 2 0  5 4 5 5 0  5 5 0 4 5  4 4 4 4 4     → 72
score of 2)          0 0 2 2 5  0 4 0 0 5  0 0 5 4 0  4 4 4 4 4     → 47
```

```
random # for 1)        0 0 0 0  0 0  0 0 1  0    0    1    0    0
1)Naive prober  C C C C C C C  C C D  C D C D C  D C  D C D
2) TFT          C C C C C C C  C C C  D C D C D  C  D C D C
score of 1)       4 4 4 4 4 4 4 4  4 5  0 5 0 5 0  5  0 5 0 5 → 66
score of 2)       4 4 4 4 4 4 4 4  4 0  5 0 5 0 5  0  5 0 5 0 → 61
```

```
random # for 1)     0  1  0
1)Naive prober  C C  D C D    D D D D D    D D D D D    D D D D D  → 45
2)Spiteful       C  C C D D    D D D D D    D D D D D    D D D D D  → 45
 score of 1)      4 4  5  0  2    2  2  2 2 2    2 2 2 2 2    2 2 2 2  2
score of 2)      4 4  0  5  2    2  2  2 2 2    2 2 2 2 2    2 2 2 2  2
```

```
random # for 1)      0  0 0 0 0 0 0 0 0 0 0 0 0 0  0 0 1 0 0
1)Naive prober   C C  C  C C  C C  C C C  C C C C C  C C D C C  → 81
2)TF2T           C C  C  C C  C C  C C C  C C C C C  C C C C C  → 76
score of 1)       4 4  4  4  4 4 4  4 4 4  4 4 4 4 4  4 4 5 4 4
score of 2)       4 4  4  4  4 4 4  4 4 4  4 4 4 4 4  4 4 0 4 4
```

```
random # for 1)       0 1  0 1 0  0 0 0 0 0  1 1 1 0 1  1 0 0 0 0
1)Random             C D C D C  C C C C C  D D D C D  D C C C C
2)tf2t               C C C C C  C C C C C  C C D D C  C D C C C
score of 1)   4 5 4 5 4  4 4 4 4 4  5 5 2 0 5  5 0 4 4 4   → 76
```

score of 2) 4 0 4 0 4 4 4 4 4 4 0 0 2 5 0 0 5 4 4 4 → **57**

II. Fill in the following table reflecting the contest's scores of the players

	Always C	Always D	TFT	Spiteful	TF2T	Random
Always C		0(100)		80(80)		
Always D						
TFT						
Spiteful						
TF2T						
Random						

III. Create a ranking list reflecting total scores of the contestants