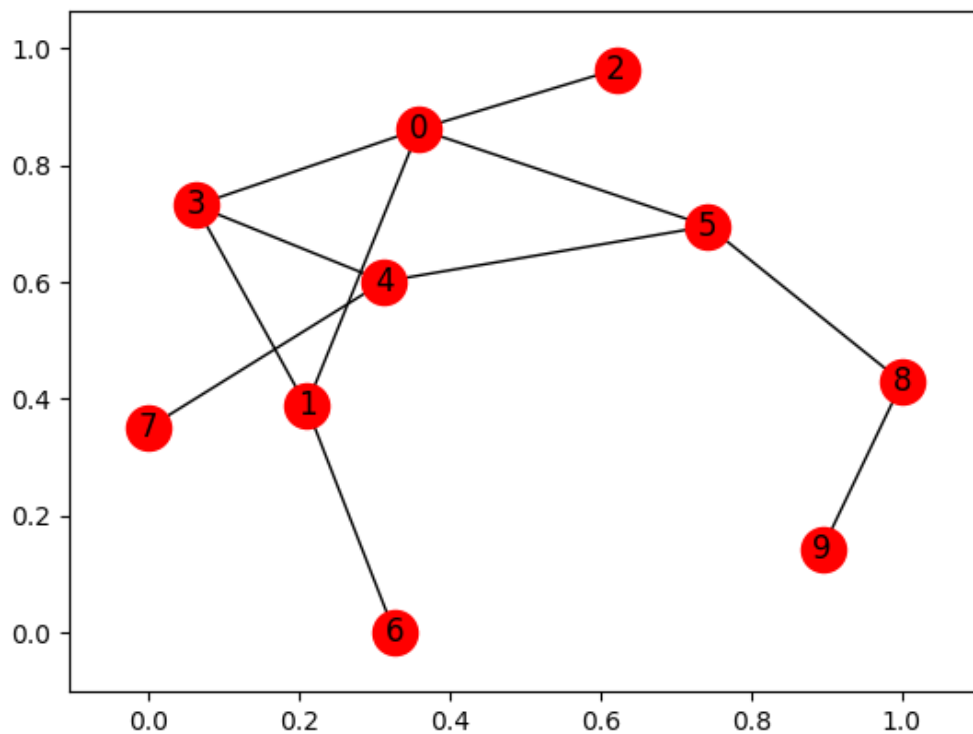


Loading Graphs in NetworkX

```
In [1]: import networkx as nx
import numpy as np
import pandas as pd
%matplotlib notebook

# Instantiate the graph
G1 = nx.Graph()
# add node/edge pairs
G1.add_edges_from([(0, 1),
                  (0, 2),
                  (0, 3),
                  (0, 5),
                  (1, 3),
                  (1, 6),
                  (3, 4),
                  (4, 5),
                  (4, 7),
                  (5, 8),
                  (8, 9)])

# draw the network G1
nx.draw_networkx(G1)
```



Adjacency List

`G_adjlist.txt` is the adjacency list representation of `G1`.

It can be read as follows:

- `0 1 2 3 5` → node 0 is adjacent to nodes 1, 2, 3, 5
- `1 3 6` → node 1 is (also) adjacent to nodes 3, 6
- `2` → node 2 is (also) adjacent to no new nodes
- `3 4` → node 3 is (also) adjacent to node 4

and so on. Note that adjacencies are only accounted for once (e.g. node 2 is adjacent to node 0, but node 0 is not listed in node 2's row, because that edge has already been accounted for in node 0's row).

```
In [2]: !cat G_adjlist.txt
```

```
0 1 2 3 5
1 3 6
2
3 4
4 5 7
5 8
6
7
8 9
9
```

If we read in the adjacency list using `nx.read_adjlist`, we can see that it matches `G1`.

```
In [3]: G2 = nx.read_adjlist('G_adjlist.txt', nodetype=int)
G2.edges()
```

```
Out[3]: [(0, 1),
(0, 2),
(0, 3),
(0, 5),
(1, 3),
(1, 6),
(3, 4),
(5, 4),
(5, 8),
(4, 7),
(8, 9)]
```

Adjacency Matrix

The elements in an adjacency matrix indicate whether pairs of vertices are adjacent or not in the graph. Each node has a corresponding row and column. For example, row 0, column 1 corresponds to the edge between node 0 and node 1.

Reading across row 0, there is a '1' in columns 1, 2, 3, and 5, which indicates that node 0 is adjacent to nodes 1, 2, 3, and 5

```
In [4]: G_mat = np.array([[0, 1, 1, 1, 0, 1, 0, 0, 0, 0],
                          [1, 0, 0, 1, 0, 0, 1, 0, 0, 0],
                          [1, 0, 0, 0, 0, 0, 0, 0, 0, 0],
                          [1, 1, 0, 0, 1, 0, 0, 0, 0, 0],
                          [0, 0, 0, 1, 0, 1, 0, 1, 0, 0],
                          [1, 0, 0, 0, 1, 0, 0, 0, 1, 0],
                          [0, 1, 0, 0, 0, 0, 0, 0, 0, 0],
                          [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
                          [0, 0, 0, 0, 0, 1, 0, 0, 0, 1],
                          [0, 0, 0, 0, 0, 0, 0, 0, 1, 0]])
G_mat
```

```
Out[4]: array([[0, 1, 1, 1, 0, 1, 0, 0, 0, 0],
               [1, 0, 0, 1, 0, 0, 1, 0, 0, 0],
               [1, 0, 0, 0, 0, 0, 0, 0, 0, 0],
               [1, 1, 0, 0, 1, 0, 0, 0, 0, 0],
               [0, 0, 0, 1, 0, 1, 0, 1, 0, 0],
               [1, 0, 0, 0, 1, 0, 0, 0, 1, 0],
               [0, 1, 0, 0, 0, 0, 0, 0, 0, 0],
               [0, 0, 0, 0, 1, 0, 0, 0, 0, 0],
               [0, 0, 0, 0, 0, 1, 0, 0, 0, 1],
               [0, 0, 0, 0, 0, 0, 0, 0, 1, 0]])
```

If we convert the adjacency matrix to a networkx graph using `nx.Graph`, we can see that it matches G1.

```
In [5]: G3 = nx.Graph(G_mat)
G3.edges()
```

```
Out[5]: [(0, 1),
          (0, 2),
          (0, 3),
          (0, 5),
          (1, 3),
          (1, 6),
          (3, 4),
          (4, 5),
          (4, 7),
          (5, 8),
          (8, 9)]
```

Edgelist

The edge list format represents edge pairings in the first two columns. Additional edge attributes can be added in subsequent columns. Looking at `G_edgelist.txt` this is the same as the original graph `G1`, but now each edge has a weight.

For example, from the first row, we can see the edge between nodes 0 and 1, has a weight of 4.

```
In [6]: !cat G_edgelist.txt
```

```
0 1 4
0 2 3
0 3 2
0 5 6
1 3 2
1 6 5
3 4 3
4 5 1
4 7 2
5 8 6
8 9 1
```

Using `read_edgelist` and passing in a list of tuples with the name and type of each edge attribute will create a graph with our desired edge attributes.

```
In [7]: G4 = nx.read_edgelist('G_edgelist.txt', data=[('Weight', int)])
```

```
G4.edges(data=True)
```

```
Out[7]: [('0', '1', {'Weight': 4}),
          ('0', '2', {'Weight': 3}),
          ('0', '3', {'Weight': 2}),
          ('0', '5', {'Weight': 6}),
          ('1', '3', {'Weight': 2}),
          ('1', '6', {'Weight': 5}),
          ('3', '4', {'Weight': 3}),
          ('5', '4', {'Weight': 1}),
          ('5', '8', {'Weight': 6}),
          ('4', '7', {'Weight': 2}),
          ('8', '9', {'Weight': 1})]
```

Pandas DataFrame

Graphs can also be created from pandas dataframes if they are in edge list format.

```
In [8]: G_df = pd.read_csv('G_edgelist.txt', delim_whitespace=True,
                           header=None, names=['n1', 'n2', 'weight'])
G_df
```

Out[8]:

	n1	n2	weight
0	0	1	4
1	0	2	3
2	0	3	2
3	0	5	6
4	1	3	2
5	1	6	5
6	3	4	3
7	4	5	1
8	4	7	2
9	5	8	6
10	8	9	1

```
In [9]: G5 = nx.from_pandas_dataframe(G_df, 'n1', 'n2', edge_attr='weight')
G5.edges(data=True)
```

```
Out[9]: [(0, 1, {'weight': 4}),
          (0, 2, {'weight': 3}),
          (0, 3, {'weight': 2}),
          (0, 5, {'weight': 6}),
          (1, 3, {'weight': 2}),
          (1, 6, {'weight': 5}),
          (3, 4, {'weight': 3}),
          (5, 4, {'weight': 1}),
          (5, 8, {'weight': 6}),
          (4, 7, {'weight': 2}),
          (8, 9, {'weight': 1})]
```

Chess Example

Now let's load in a more complex graph and perform some basic analysis on it.

We will be looking at chess_graph.txt, which is a directed graph of chess games in edge list format.

```
In [10]: !head -5 chess_graph.txt
```

```
1 2 0 885635999.999997
1 3 0 885635999.999997
1 4 0 885635999.999997
1 5 1 885635999.999997
1 6 0 885635999.999997
```

Each node is a chess player, and each edge represents a game. The first column with an outgoing edge corresponds to the white player, the second column with an incoming edge corresponds to the black player.

The third column, the weight of the edge, corresponds to the outcome of the game. A weight of 1 indicates white won, a 0 indicates a draw, and a -1 indicates black won.

The fourth column corresponds to approximate timestamps of when the game was played.

We can read in the chess graph using `read_edgelist`, and tell it to create the graph using a `nx.MultiDiGraph`.

```
In [11]: chess = nx.read_edgelist('chess_graph.txt', data=[('outcome', int), ('timestamp', float)],
                                create_using=nx.MultiDiGraph())
```

```
In [12]: chess.is_directed(), chess.is_multigraph()
```

```
Out[12]: (True, True)
```

```
In [13]: chess.edges(data=True)
```

```
Out[13]: [('1', '2', {'outcome': 0, 'timestamp': 885635999.999997}),
('1', '3', {'outcome': 0, 'timestamp': 885635999.999997}),
('1', '4', {'outcome': 0, 'timestamp': 885635999.999997}),
('1', '5', {'outcome': 1, 'timestamp': 885635999.999997}),
('1', '6', {'outcome': 0, 'timestamp': 885635999.999997}),
('1', '807', {'outcome': 0, 'timestamp': 896148000.000003}),
('1', '454', {'outcome': 0, 'timestamp': 896148000.000003}),
('1', '827', {'outcome': 0, 'timestamp': 901403999.999997}),
('1', '1240', {'outcome': 0, 'timestamp': 906660000.0}),
('1', '680', {'outcome': 0, 'timestamp': 906660000.0}),
('1', '166', {'outcome': -1, 'timestamp': 906660000.0}),
('1', '1241', {'outcome': 0, 'timestamp': 906660000.0}),
('1', '1242', {'outcome': 0, 'timestamp': 906660000.0}),
('1', '808', {'outcome': 0, 'timestamp': 925055999.999997}),
('1', '819', {'outcome': 0, 'timestamp': 925055999.999997}),
('1', '448', {'outcome': 0, 'timestamp': 927684000.000003}),
('1', '1214', {'outcome': 0, 'timestamp': 927684000.000003}),
('1', '1217', {'outcome': 0, 'timestamp': 927684000.000003}),
('1', '2454', {'outcome': 0, 'timestamp': 938196000.0}),
('1', '925', {'outcome': 1, 'timestamp': 1064340000.0}),
('1', '91', {'outcome': 1, 'timestamp': 1064340000.0}),
('1', '4477', {'outcome': 0, 'timestamp': 1098504000.0}),
('1', '1363', {'outcome': 0, 'timestamp': 1098504000.0}),
('1', '3644', {'outcome': 1, 'timestamp': 1098504000.0}),
('1', '1615', {'outcome': 0, 'timestamp': 1098504000.0}),
('1', '1051', {'outcome': 0, 'timestamp': 1127412000.0}),
('2', '3', {'outcome': -1, 'timestamp': 885635999.999997}),
('2', '1166', {'outcome': 1, 'timestamp': 904032000.000003}),
('2', '303', {'outcome': 1, 'timestamp': 904032000.000003}),
('2', '926', {'outcome': 1, 'timestamp': 904032000.000003}),
('2', '1117', {'outcome': 0, 'timestamp': 904032000.000003}),
('2', '2010', {'outcome': -1, 'timestamp': 930312000.0}),
('2', '172', {'outcome': 0, 'timestamp': 930312000.0}),
('2', '172', {'outcome': 1, 'timestamp': 1053828000.0}),
('2', '2240', {'outcome': 0, 'timestamp': 930312000.0}),
('2', '2240', {'outcome': 0, 'timestamp': 1145808000.0}),
('2', '371', {'outcome': 0, 'timestamp': 935568000.000003}),
('2', '14', {'outcome': -1, 'timestamp': 935568000.000003}),
('2', '277', {'outcome': -1, 'timestamp': 946080000.0}),
('2', '152', {'outcome': 1, 'timestamp': 985500000.0}),
('2', '23', {'outcome': 1, 'timestamp': 993384000.0}),
('2', '1439', {'outcome': -1, 'timestamp': 993384000.0}),
('2', '610', {'outcome': 0, 'timestamp': 1011780000.0}),
('2', '3991', {'outcome': 0, 'timestamp': 1048572000.0}),
('2', '421', {'outcome': 1, 'timestamp': 1059084000.0}),
('2', '462', {'outcome': 1, 'timestamp': 1059084000.0}),
('2', '483', {'outcome': 0, 'timestamp': 1064340000.0}),
('2', '879', {'outcome': 1, 'timestamp': 1064340000.0}),
('2', '456', {'outcome': 1, 'timestamp': 1066968000.0}),
('2', '456', {'outcome': 0, 'timestamp': 1109016000.0}),
('2', '623', {'outcome': 0, 'timestamp': 1066968000.0}),
('2', '477', {'outcome': 0, 'timestamp': 1074852000.0}),
('2', '3776', {'outcome': 1, 'timestamp': 1082736000.0}),
('2', '673', {'outcome': 1, 'timestamp': 1082736000.0}),
('2', '580', {'outcome': -1, 'timestamp': 1082736000.0}),
('2', '64', {'outcome': 0, 'timestamp': 1082736000.0}),
('2', '2028', {'outcome': 1, 'timestamp': 1085364000.0})]
```



```
('2', '1677', {'outcome': 1, 'timestamp': 1087992000.0}),
('2', '112', {'outcome': 0, 'timestamp': 1090620000.0}),
('2', '545', {'outcome': 1, 'timestamp': 1090620000.0}),
('2', '545', {'outcome': 0, 'timestamp': 1119528000.0}),
('2', '639', {'outcome': 0, 'timestamp': 1093248000.0}),
('2', '412', {'outcome': 0, 'timestamp': 1109016000.0}),
('2', '983', {'outcome': 0, 'timestamp': 1119528000.0}),
('2', '1529', {'outcome': 1, 'timestamp': 1122156000.0}),
('2', '418', {'outcome': 1, 'timestamp': 1124784000.0}),
('2', '621', {'outcome': 0, 'timestamp': 1124784000.0}),
('2', '74', {'outcome': 1, 'timestamp': 1127412000.0}),
('2', '3830', {'outcome': 1, 'timestamp': 1127412000.0}),
('2', '1184', {'outcome': 0, 'timestamp': 1130040000.0}),
('2', '9', {'outcome': 0, 'timestamp': 1143180000.0}),
('2', '3989', {'outcome': 0, 'timestamp': 1143180000.0}),
('2', '3465', {'outcome': 1, 'timestamp': 1143180000.0}),
('2', '7200', {'outcome': 1, 'timestamp': 1145808000.0}),
('2', '90', {'outcome': 0, 'timestamp': 1145808000.0}),
('3', '89', {'outcome': 0, 'timestamp': 885635999.999997}),
('3', '172', {'outcome': -1, 'timestamp': 885635999.999997}),
('3', '4', {'outcome': 0, 'timestamp': 885635999.999997}),
('3', '236', {'outcome': 1, 'timestamp': 885635999.999997}),
('3', '6', {'outcome': 1, 'timestamp': 885635999.999997}),
('3', '542', {'outcome': 0, 'timestamp': 890892000.0}),
('3', '602', {'outcome': 0, 'timestamp': 890892000.0}),
('3', '602', {'outcome': 1, 'timestamp': 956591999.999997}),
('3', '680', {'outcome': -1, 'timestamp': 901403999.999997}),
('3', '117', {'outcome': 1, 'timestamp': 901403999.999997}),
('3', '1035', {'outcome': 0, 'timestamp': 901403999.999997}),
('3', '1035', {'outcome': 0, 'timestamp': 1051200000.0}),
('3', '1', {'outcome': 0, 'timestamp': 906660000.0}),
('3', '1', {'outcome': 0, 'timestamp': 925055999.999997}),
('3', '1181', {'outcome': 1, 'timestamp': 906660000.0}),
('3', '91', {'outcome': 1, 'timestamp': 906660000.0}),
('3', '91', {'outcome': 1, 'timestamp': 1101132000.0}),
('3', '59', {'outcome': 0, 'timestamp': 906660000.0}),
('3', '1242', {'outcome': 0, 'timestamp': 906660000.0}),
('3', '808', {'outcome': 0, 'timestamp': 925055999.999997}),
('3', '808', {'outcome': 0, 'timestamp': 956591999.999997}),
('3', '9', {'outcome': 0, 'timestamp': 938196000.0}),
('3', '9', {'outcome': 0, 'timestamp': 956591999.999997}),
('3', '9', {'outcome': 0, 'timestamp': 1051200000.0}),
('3', '1472', {'outcome': -1, 'timestamp': 938196000.0}),
('3', '453', {'outcome': 0, 'timestamp': 1019664000.0}),
('3', '453', {'outcome': 1, 'timestamp': 1032804000.0}),
('3', '453', {'outcome': 0, 'timestamp': 1051200000.0}),
('3', '1432', {'outcome': 1, 'timestamp': 1019664000.0}),
('3', '1125', {'outcome': 0, 'timestamp': 1032804000.0}),
('3', '516', {'outcome': 0, 'timestamp': 1064340000.0}),
('3', '448', {'outcome': 0, 'timestamp': 1064340000.0}),
('3', '1241', {'outcome': 0, 'timestamp': 1064340000.0}),
('3', '807', {'outcome': 0, 'timestamp': 1098504000.0}),
('3', '1363', {'outcome': 0, 'timestamp': 1098504000.0}),
('3', '1406', {'outcome': 0, 'timestamp': 1098504000.0}),
('3', '1123', {'outcome': -1, 'timestamp': 1101132000.0}),
('3', '18', {'outcome': 1, 'timestamp': 1101132000.0}),
('3', '3934', {'outcome': -1, 'timestamp': 1119528000.0}),
```

```
('3', '1809', {'outcome': 0, 'timestamp': 1119528000.0}),
('3', '4234', {'outcome': 0, 'timestamp': 1119528000.0}),
('3', '3058', {'outcome': 0, 'timestamp': 1122156000.0}),
('3', '1066', {'outcome': 0, 'timestamp': 1122156000.0}),
('3', '118', {'outcome': 0, 'timestamp': 1122156000.0}),
('3', '4182', {'outcome': 0, 'timestamp': 1124784000.0}),
('3', '681', {'outcome': 0, 'timestamp': 1124784000.0}),
('3', '394', {'outcome': 0, 'timestamp': 1127412000.0}),
('4', '89', {'outcome': 0, 'timestamp': 885635999.999997}),
('4', '172', {'outcome': 0, 'timestamp': 885635999.999997}),
('4', '236', {'outcome': 1, 'timestamp': 885635999.999997}),
('4', '91', {'outcome': 1, 'timestamp': 885635999.999997}),
('4', '992', {'outcome': 1, 'timestamp': 1051200000.0}),
('4', '1245', {'outcome': 0, 'timestamp': 1051200000.0}),
('5', '4', {'outcome': 0, 'timestamp': 885635999.999997}),
('5', '236', {'outcome': 1, 'timestamp': 885635999.999997}),
('5', '6', {'outcome': -1, 'timestamp': 885635999.999997}),
('5', '115', {'outcome': -1, 'timestamp': 998640000.000003}),
('5', '3318', {'outcome': -1, 'timestamp': 998640000.000003}),
('5', '56', {'outcome': 0, 'timestamp': 998640000.000003}),
('5', '2266', {'outcome': 0, 'timestamp': 1103760000.0}),
('5', '4637', {'outcome': -1, 'timestamp': 1103760000.0}),
('5', '4628', {'outcome': -1, 'timestamp': 1135296000.0}),
('5', '2677', {'outcome': 0, 'timestamp': 1135296000.0}),
('6', '4', {'outcome': 0, 'timestamp': 885635999.999997}),
('6', '91', {'outcome': 0, 'timestamp': 885635999.999997}),
('6', '453', {'outcome': 1, 'timestamp': 890892000.0}),
('6', '3', {'outcome': 0, 'timestamp': 890892000.0}),
('6', '454', {'outcome': 0, 'timestamp': 890892000.0}),
('6', '182', {'outcome': 0, 'timestamp': 896148000.000003}),
('6', '118', {'outcome': 1, 'timestamp': 896148000.000003}),
('6', '680', {'outcome': 1, 'timestamp': 901403999.999997}),
('6', '142', {'outcome': 1, 'timestamp': 901403999.999997}),
('6', '1035', {'outcome': 0, 'timestamp': 901403999.999997}),
('6', '818', {'outcome': 0, 'timestamp': 906660000.0}),
('6', '139', {'outcome': 1, 'timestamp': 906660000.0}),
('6', '1262', {'outcome': 1, 'timestamp': 906660000.0}),
('6', '257', {'outcome': 0, 'timestamp': 946080000.0}),
('6', '586', {'outcome': 0, 'timestamp': 946080000.0}),
('6', '84', {'outcome': 1, 'timestamp': 985500000.0}),
('6', '1711', {'outcome': 0, 'timestamp': 985500000.0}),
('6', '214', {'outcome': 1, 'timestamp': 985500000.0}),
('6', '90', {'outcome': -1, 'timestamp': 1024920000.0}),
('6', '90', {'outcome': 0, 'timestamp': 1024920000.0}),
('6', '332', {'outcome': 1, 'timestamp': 1024920000.0}),
('6', '332', {'outcome': 1, 'timestamp': 1024920000.0}),
('6', '1166', {'outcome': 1, 'timestamp': 1032804000.0}),
('6', '1556', {'outcome': 1, 'timestamp': 1032804000.0}),
('6', '440', {'outcome': 0, 'timestamp': 1032804000.0}),
('6', '500', {'outcome': 1, 'timestamp': 1032804000.0}),
('6', '913', {'outcome': 0, 'timestamp': 1082736000.0}),
('6', '1308', {'outcome': -1, 'timestamp': 1082736000.0}),
('6', '2972', {'outcome': 0, 'timestamp': 1082736000.0}),
('6', '4302', {'outcome': -1, 'timestamp': 1101132000.0}),
('6', '4029', {'outcome': 1, 'timestamp': 1101132000.0}),
('6', '4862', {'outcome': -1, 'timestamp': 1122156000.0}),
('6', '1282', {'outcome': -1, 'timestamp': 1122156000.0}),
```

```
('6', '3737', {'outcome': 1, 'timestamp': 1122156000.0}),
('6', '5919', {'outcome': 0, 'timestamp': 1132668000.0}),
('6', '3497', {'outcome': 1, 'timestamp': 1132668000.0}),
('6', '4883', {'outcome': 0, 'timestamp': 1132668000.0}),
('6', '6001', {'outcome': 1, 'timestamp': 1132668000.0}),
('6', '6023', {'outcome': 0, 'timestamp': 1132668000.0}),
('6', '3103', {'outcome': 0, 'timestamp': 1135296000.0}),
('6', '39', {'outcome': 0, 'timestamp': 1140552000.0}),
('6', '3113', {'outcome': 1, 'timestamp': 1140552000.0}),
('6', '128', {'outcome': 0, 'timestamp': 1140552000.0}),
('6', '7115', {'outcome': 0, 'timestamp': 1143180000.0}),
('6', '870', {'outcome': 0, 'timestamp': 1143180000.0}),
('6', '7166', {'outcome': -1, 'timestamp': 1143180000.0}),
('6', '2008', {'outcome': 0, 'timestamp': 1145808000.0}),
('7', '8', {'outcome': 0, 'timestamp': 885635999.999997}),
('7', '9', {'outcome': 1, 'timestamp': 885635999.999997}),
('7', '10', {'outcome': 1, 'timestamp': 885635999.999997}),
('8', '67', {'outcome': -1, 'timestamp': 885635999.999997}),
('8', '67', {'outcome': -1, 'timestamp': 888264000.000003}),
('8', '20', {'outcome': 0, 'timestamp': 885635999.999997}),
('8', '68', {'outcome': 1, 'timestamp': 885635999.999997}),
('8', '69', {'outcome': 1, 'timestamp': 885635999.999997}),
('8', '277', {'outcome': 0, 'timestamp': 888264000.000003}),
('8', '322', {'outcome': -1, 'timestamp': 888264000.000003}),
('8', '323', {'outcome': 0, 'timestamp': 888264000.000003}),
('8', '324', {'outcome': 0, 'timestamp': 888264000.000003}),
('8', '631', {'outcome': 0, 'timestamp': 919800000.000003}),
('8', '946', {'outcome': 0, 'timestamp': 1143180000.0}),
('8', '4060', {'outcome': 0, 'timestamp': 1143180000.0}),
('9', '113', {'outcome': -1, 'timestamp': 885635999.999997}),
('9', '114', {'outcome': 0, 'timestamp': 885635999.999997}),
('9', '477', {'outcome': 0, 'timestamp': 890892000.0}),
('9', '269', {'outcome': 1, 'timestamp': 890892000.0}),
('9', '200', {'outcome': 0, 'timestamp': 919800000.000003}),
('9', '436', {'outcome': 0, 'timestamp': 919800000.000003}),
('9', '436', {'outcome': 0, 'timestamp': 922428000.0}),
('9', '285', {'outcome': -1, 'timestamp': 922428000.0}),
('9', '1194', {'outcome': 0, 'timestamp': 922428000.0}),
('9', '448', {'outcome': 0, 'timestamp': 927684000.000003}),
('9', '807', {'outcome': 0, 'timestamp': 927684000.000003}),
('9', '1214', {'outcome': 1, 'timestamp': 927684000.000003}),
('9', '1491', {'outcome': 1, 'timestamp': 927684000.000003}),
('9', '1167', {'outcome': 1, 'timestamp': 938196000.0}),
('9', '2457', {'outcome': 1, 'timestamp': 938196000.0}),
('9', '2515', {'outcome': 1, 'timestamp': 938196000.0}),
('9', '819', {'outcome': 0, 'timestamp': 938196000.0}),
('9', '819', {'outcome': 1, 'timestamp': 948707999.999997}),
('9', '91', {'outcome': -1, 'timestamp': 938196000.0}),
('9', '1123', {'outcome': 0, 'timestamp': 948707999.999997}),
('9', '310', {'outcome': 0, 'timestamp': 951336000.000003}),
('9', '1252', {'outcome': 1, 'timestamp': 956591999.999997}),
('9', '2247', {'outcome': 0, 'timestamp': 956591999.999997}),
('9', '602', {'outcome': 0, 'timestamp': 956591999.999997}),
('9', '736', {'outcome': 0, 'timestamp': 977616000.0}),
('9', '2413', {'outcome': 0, 'timestamp': 977616000.0}),
('9', '1466', {'outcome': 1, 'timestamp': 977616000.0}),
('9', '130', {'outcome': 0, 'timestamp': 985500000.0}),
```

```
('9', '130', {'outcome': -1, 'timestamp': 993384000.0}),
('9', '669', {'outcome': -1, 'timestamp': 985500000.0}),
('9', '712', {'outcome': 0, 'timestamp': 985500000.0}),
('9', '3113', {'outcome': -1, 'timestamp': 985500000.0}),
('9', '3113', {'outcome': 1, 'timestamp': 1145808000.0}),
('9', '653', {'outcome': -1, 'timestamp': 993384000.0}),
('9', '330', {'outcome': -1, 'timestamp': 993384000.0}),
('9', '330', {'outcome': 1, 'timestamp': 1135296000.0}),
('9', '731', {'outcome': 0, 'timestamp': 993384000.0}),
('9', '81', {'outcome': 1, 'timestamp': 1006524000.0}),
('9', '3139', {'outcome': 1, 'timestamp': 1006524000.0}),
('9', '127', {'outcome': 0, 'timestamp': 1006524000.0}),
('9', '3101', {'outcome': 1, 'timestamp': 1009152000.0}),
('9', '1929', {'outcome': -1, 'timestamp': 1009152000.0}),
('9', '889', {'outcome': -1, 'timestamp': 1024920000.0}),
('9', '223', {'outcome': 0, 'timestamp': 1038060000.0}),
('9', '3038', {'outcome': 1, 'timestamp': 1038060000.0}),
('9', '3135', {'outcome': 1, 'timestamp': 1038060000.0}),
('9', '128', {'outcome': 1, 'timestamp': 1038060000.0}),
('9', '3505', {'outcome': 1, 'timestamp': 1048572000.0}),
('9', '635', {'outcome': -1, 'timestamp': 1048572000.0}),
('9', '453', {'outcome': 0, 'timestamp': 1051200000.0}),
('9', '87', {'outcome': 1, 'timestamp': 1051200000.0}),
('9', '1035', {'outcome': -1, 'timestamp': 1051200000.0}),
('9', '3201', {'outcome': 0, 'timestamp': 1051200000.0}),
('9', '817', {'outcome': 1, 'timestamp': 1056456000.0}),
('9', '1927', {'outcome': -1, 'timestamp': 1072224000.0}),
('9', '4543', {'outcome': 1, 'timestamp': 1101132000.0}),
('9', '4545', {'outcome': 1, 'timestamp': 1101132000.0}),
('9', '4544', {'outcome': 1, 'timestamp': 1101132000.0}),
('9', '3524', {'outcome': 0, 'timestamp': 1135296000.0}),
('9', '39', {'outcome': 0, 'timestamp': 1140552000.0}),
('9', '4060', {'outcome': 0, 'timestamp': 1143180000.0}),
('9', '1117', {'outcome': 0, 'timestamp': 1143180000.0}),
('9', '1676', {'outcome': 1, 'timestamp': 1145808000.0}),
('9', '4549', {'outcome': 1, 'timestamp': 1145808000.0}),
('9', '4542', {'outcome': 1, 'timestamp': 1145808000.0}),
('10', '114', {'outcome': -1, 'timestamp': 985500000.0}),
('11', '12', {'outcome': -1, 'timestamp': 885635999.999997}),
('12', '48', {'outcome': -1, 'timestamp': 885635999.999997}),
('12', '517', {'outcome': 0, 'timestamp': 917171999.999997}),
('12', '1932', {'outcome': 0, 'timestamp': 917171999.999997}),
('12', '115', {'outcome': 1, 'timestamp': 948707999.999997}),
('12', '93', {'outcome': 1, 'timestamp': 948707999.999997}),
('12', '278', {'outcome': 0, 'timestamp': 948707999.999997}),
('12', '2070', {'outcome': 1, 'timestamp': 972359999.999997}),
('12', '974', {'outcome': 1, 'timestamp': 980243999.999997}),
('12', '3658', {'outcome': 1, 'timestamp': 1030176000.0}),
('12', '1796', {'outcome': 1, 'timestamp': 1064340000.0}),
('12', '77', {'outcome': 0, 'timestamp': 1090620000.0}),
('12', '1087', {'outcome': 1, 'timestamp': 1101132000.0}),
('12', '224', {'outcome': -1, 'timestamp': 1101132000.0}),
('12', '3465', {'outcome': 0, 'timestamp': 1101132000.0}),
('12', '366', {'outcome': 0, 'timestamp': 1101132000.0}),
('12', '34', {'outcome': 1, 'timestamp': 1122156000.0}),
('12', '4886', {'outcome': 0, 'timestamp': 1122156000.0}),
('12', '25', {'outcome': 0, 'timestamp': 1122156000.0}),
```

```
('12', '1957', {'outcome': 1, 'timestamp': 1122156000.0}),
('12', '1835', {'outcome': 1, 'timestamp': 1124784000.0}),
('12', '2526', {'outcome': 0, 'timestamp': 1127412000.0}),
('12', '3745', {'outcome': 0, 'timestamp': 1127412000.0}),
('12', '170', {'outcome': 1, 'timestamp': 1132668000.0}),
('12', '1911', {'outcome': 0, 'timestamp': 1132668000.0}),
('12', '1201', {'outcome': 0, 'timestamp': 1132668000.0}),
('12', '287', {'outcome': 0, 'timestamp': 1135296000.0}),
('12', '3024', {'outcome': 0, 'timestamp': 1143180000.0}),
('12', '1177', {'outcome': -1, 'timestamp': 1143180000.0}),
('12', '174', {'outcome': 0, 'timestamp': 1145808000.0}),
('12', '357', {'outcome': 0, 'timestamp': 1145808000.0}),
('13', '14', {'outcome': 1, 'timestamp': 885635999.999997}),
('13', '14', {'outcome': 1, 'timestamp': 904032000.000003}),
('13', '14', {'outcome': 0, 'timestamp': 911916000.000003}),
('13', '280', {'outcome': 0, 'timestamp': 898776000.0}),
('13', '280', {'outcome': 0, 'timestamp': 914544000.0}),
('13', '280', {'outcome': 0, 'timestamp': 993384000.0}),
('13', '280', {'outcome': -1, 'timestamp': 1040688000.0}),
('13', '280', {'outcome': 0, 'timestamp': 1043316000.0}),
('13', '280', {'outcome': 0, 'timestamp': 1061712000.0}),
('13', '280', {'outcome': 1, 'timestamp': 1072224000.0}),
('13', '280', {'outcome': 0, 'timestamp': 1124784000.0}),
('13', '280', {'outcome': 0, 'timestamp': 1135296000.0}),
('13', '275', {'outcome': 1, 'timestamp': 898776000.0}),
('13', '275', {'outcome': 0, 'timestamp': 930312000.0}),
('13', '275', {'outcome': 0, 'timestamp': 948707999.999997}),
('13', '275', {'outcome': 1, 'timestamp': 1040688000.0}),
('13', '275', {'outcome': -1, 'timestamp': 1043316000.0}),
('13', '275', {'outcome': 0, 'timestamp': 1051200000.0}),
('13', '275', {'outcome': 1, 'timestamp': 1066968000.0}),
('13', '275', {'outcome': 0, 'timestamp': 1072224000.0}),
('13', '275', {'outcome': 0, 'timestamp': 1135296000.0}),
('13', '211', {'outcome': 0, 'timestamp': 904032000.000003}),
('13', '211', {'outcome': 0, 'timestamp': 1022292000.0}),
('13', '211', {'outcome': 1, 'timestamp': 1072224000.0}),
('13', '211', {'outcome': 0, 'timestamp': 1124784000.0}),
('13', '188', {'outcome': 0, 'timestamp': 904032000.000003}),
('13', '461', {'outcome': 1, 'timestamp': 911916000.000003}),
('13', '461', {'outcome': 1, 'timestamp': 1098504000.0}),
('13', '503', {'outcome': 1, 'timestamp': 911916000.000003}),
('13', '503', {'outcome': 1, 'timestamp': 1022292000.0}),
('13', '98', {'outcome': 1, 'timestamp': 914544000.0}),
('13', '98', {'outcome': 0, 'timestamp': 977616000.0}),
('13', '98', {'outcome': 1, 'timestamp': 1032804000.0}),
('13', '98', {'outcome': 1, 'timestamp': 1103760000.0}),
('13', '801', {'outcome': 0, 'timestamp': 914544000.0}),
('13', '801', {'outcome': -1, 'timestamp': 930312000.0}),
('13', '801', {'outcome': 1, 'timestamp': 1032804000.0}),
('13', '801', {'outcome': 0, 'timestamp': 1061712000.0}),
('13', '801', {'outcome': 1, 'timestamp': 1124784000.0}),
('13', '180', {'outcome': -1, 'timestamp': 946080000.0}),
('13', '731', {'outcome': 0, 'timestamp': 946080000.0}),
('13', '257', {'outcome': 0, 'timestamp': 946080000.0}),
('13', '913', {'outcome': 0, 'timestamp': 948707999.999997}),
('13', '913', {'outcome': 0, 'timestamp': 980243999.999997}),
('13', '913', {'outcome': 0, 'timestamp': 1043316000.0}),
```

```
('13', '1027', {'outcome': 1, 'timestamp': 969732000.0}),
('13', '1027', {'outcome': 0, 'timestamp': 1066968000.0}),
('13', '673', {'outcome': 1, 'timestamp': 969732000.0}),
('13', '1244', {'outcome': 1, 'timestamp': 969732000.0}),
('13', '537', {'outcome': 1, 'timestamp': 977616000.0}),
('13', '537', {'outcome': 1, 'timestamp': 980243999.999997}),
('13', '537', {'outcome': 1, 'timestamp': 1040688000.0}),
('13', '537', {'outcome': 0, 'timestamp': 1051200000.0}),
('13', '1791', {'outcome': 0, 'timestamp': 977616000.0}),
('13', '1791', {'outcome': 1, 'timestamp': 980243999.999997}),
('13', '1791', {'outcome': -1, 'timestamp': 993384000.0}),
('13', '1791', {'outcome': 0, 'timestamp': 1103760000.0}),
('13', '1791', {'outcome': 0, 'timestamp': 1137924000.0}),
('13', '1202', {'outcome': 0, 'timestamp': 1003896000.0}),
('13', '462', {'outcome': 1, 'timestamp': 1003896000.0}),
('13', '467', {'outcome': 0, 'timestamp': 1009152000.0}),
('13', '440', {'outcome': 1, 'timestamp': 1009152000.0}),
('13', '53', {'outcome': 1, 'timestamp': 1009152000.0}),
('13', '371', {'outcome': 1, 'timestamp': 1024920000.0}),
('13', '371', {'outcome': 0, 'timestamp': 1040688000.0}),
('13', '371', {'outcome': 0, 'timestamp': 1061712000.0}),
('13', '371', {'outcome': 1, 'timestamp': 1103760000.0}),
('13', '371', {'outcome': 1, 'timestamp': 1124784000.0}),
('13', '439', {'outcome': 1, 'timestamp': 1061712000.0}),
('13', '500', {'outcome': 0, 'timestamp': 1066968000.0}),
('13', '1108', {'outcome': 0, 'timestamp': 1072224000.0}),
('13', '1108', {'outcome': 0, 'timestamp': 1103760000.0}),
('13', '1108', {'outcome': -1, 'timestamp': 1137924000.0}),
('13', '272', {'outcome': 0, 'timestamp': 1098504000.0}),
('13', '1025', {'outcome': 0, 'timestamp': 1103760000.0}),
('13', '580', {'outcome': 1, 'timestamp': 1124784000.0}),
('13', '635', {'outcome': 0, 'timestamp': 1135296000.0}),
('13', '2574', {'outcome': 0, 'timestamp': 1137924000.0}),
('14', '13', {'outcome': 0, 'timestamp': 885635999.999997}),
('14', '13', {'outcome': 0, 'timestamp': 911916000.000003}),
('14', '280', {'outcome': 1, 'timestamp': 885635999.999997}),
('14', '280', {'outcome': 0, 'timestamp': 898776000.0}),
('14', '53', {'outcome': 0, 'timestamp': 898776000.0}),
('14', '53', {'outcome': 0, 'timestamp': 1143180000.0}),
('14', '455', {'outcome': 1, 'timestamp': 904032000.000003}),
('14', '537', {'outcome': -1, 'timestamp': 904032000.000003}),
('14', '257', {'outcome': 0, 'timestamp': 904032000.000003}),
('14', '637', {'outcome': 0, 'timestamp': 906660000.0}),
('14', '731', {'outcome': 1, 'timestamp': 906660000.0}),
('14', '731', {'outcome': 0, 'timestamp': 1038060000.0}),
('14', '207', {'outcome': 0, 'timestamp': 906660000.0}),
('14', '1245', {'outcome': 0, 'timestamp': 906660000.0}),
('14', '1178', {'outcome': 1, 'timestamp': 906660000.0}),
('14', '1160', {'outcome': 0, 'timestamp': 906660000.0}),
('14', '1160', {'outcome': 0, 'timestamp': 1116900000.0}),
('14', '2028', {'outcome': -1, 'timestamp': 935568000.000003}),
('14', '952', {'outcome': 1, 'timestamp': 935568000.000003}),
('14', '275', {'outcome': 0, 'timestamp': 938196000.0}),
('14', '275', {'outcome': 0, 'timestamp': 1032804000.0}),
('14', '98', {'outcome': 1, 'timestamp': 946080000.0}),
('14', '643', {'outcome': 0, 'timestamp': 946080000.0}),
('14', '211', {'outcome': 0, 'timestamp': 946080000.0}),
```

```
('14', '127', {'outcome': 0, 'timestamp': 946080000.0}),
('14', '580', {'outcome': -1, 'timestamp': 969732000.0}),
('14', '798', {'outcome': 0, 'timestamp': 982872000.000003}),
('14', '1013', {'outcome': 0, 'timestamp': 988127999.999997}),
('14', '3174', {'outcome': 1, 'timestamp': 988127999.999997}),
('14', '522', {'outcome': 1, 'timestamp': 988127999.999997}),
('14', '1095', {'outcome': 1, 'timestamp': 988127999.999997}),
('14', '573', {'outcome': 0, 'timestamp': 988127999.999997}),
('14', '1201', {'outcome': 0, 'timestamp': 988127999.999997}),
('14', '595', {'outcome': -1, 'timestamp': 988127999.999997}),
('14', '862', {'outcome': 0, 'timestamp': 988127999.999997}),
('14', '28', {'outcome': 1, 'timestamp': 998640000.000003}),
('14', '3195', {'outcome': 1, 'timestamp': 998640000.000003}),
('14', '519', {'outcome': 0, 'timestamp': 998640000.000003}),
('14', '500', {'outcome': 0, 'timestamp': 998640000.000003}),
('14', '838', {'outcome': 0, 'timestamp': 998640000.000003}),
('14', '238', {'outcome': 0, 'timestamp': 1001268000.0}),
('14', '574', {'outcome': 0, 'timestamp': 1001268000.0}),
('14', '828', {'outcome': 1, 'timestamp': 1011780000.0}),
('14', '251', {'outcome': 0, 'timestamp': 1017036000.0}),
('14', '510', {'outcome': 0, 'timestamp': 1017036000.0}),
('14', '412', {'outcome': 1, 'timestamp': 1019664000.0}),
('14', '228', {'outcome': 0, 'timestamp': 1032804000.0}),
('14', '259', {'outcome': 0, 'timestamp': 1038060000.0}),
('14', '132', {'outcome': 0, 'timestamp': 1038060000.0}),
('14', '586', {'outcome': 0, 'timestamp': 1069596000.0}),
('14', '561', {'outcome': 0, 'timestamp': 1074852000.0}),
('14', '2836', {'outcome': -1, 'timestamp': 1080108000.0}),
('14', '684', {'outcome': 0, 'timestamp': 1093248000.0}),
('14', '36', {'outcome': 0, 'timestamp': 1095876000.0}),
('14', '1430', {'outcome': 1, 'timestamp': 1095876000.0}),
('14', '3990', {'outcome': 1, 'timestamp': 1106388000.0}),
('14', '387', {'outcome': 0, 'timestamp': 1106388000.0}),
('14', '3326', {'outcome': 1, 'timestamp': 1106388000.0}),
('14', '3326', {'outcome': 0, 'timestamp': 1111644000.0}),
('14', '1169', {'outcome': 0, 'timestamp': 1111644000.0}),
('14', '421', {'outcome': 0, 'timestamp': 1114272000.0}),
('14', '1925', {'outcome': 0, 'timestamp': 1122156000.0}),
('14', '3124', {'outcome': 0, 'timestamp': 1122156000.0}),
('14', '983', {'outcome': -1, 'timestamp': 1122156000.0}),
('14', '2714', {'outcome': 0, 'timestamp': 1130040000.0}),
('14', '414', {'outcome': 0, 'timestamp': 1137924000.0}),
('14', '414', {'outcome': 1, 'timestamp': 1143180000.0}),
('14', '139', {'outcome': 1, 'timestamp': 1137924000.0}),
('14', '3989', {'outcome': 0, 'timestamp': 1137924000.0}),
('14', '1566', {'outcome': 1, 'timestamp': 1143180000.0}),
('14', '1244', {'outcome': 1, 'timestamp': 1143180000.0}),
('14', '3077', {'outcome': 1, 'timestamp': 1143180000.0}),
('14', '3406', {'outcome': 1, 'timestamp': 1143180000.0}),
('14', '621', {'outcome': 0, 'timestamp': 1145808000.0}),
('14', '64', {'outcome': 0, 'timestamp': 1145808000.0}),
('14', '1294', {'outcome': 0, 'timestamp': 1145808000.0}),
('15', '16', {'outcome': 1, 'timestamp': 885635999.999997}),
('15', '1266', {'outcome': 1, 'timestamp': 906660000.0}),
('15', '1267', {'outcome': 1, 'timestamp': 906660000.0}),
('15', '197', {'outcome': 0, 'timestamp': 917171999.999997}),
('15', '254', {'outcome': -1, 'timestamp': 917171999.999997}),
```

```
('15', '256', {'outcome': -1, 'timestamp': 917171999.999997}),
('15', '2710', {'outcome': 1, 'timestamp': 948707999.999997}),
('15', '104', {'outcome': -1, 'timestamp': 948707999.999997}),
('15', '2371', {'outcome': 0, 'timestamp': 988127999.999997}),
('15', '3145', {'outcome': -1, 'timestamp': 988127999.999997}),
('15', '3150', {'outcome': -1, 'timestamp': 1127412000.0}),
('15', '5176', {'outcome': 1, 'timestamp': 1127412000.0}),
('15', '921', {'outcome': 0, 'timestamp': 1127412000.0}),
('15', '5177', {'outcome': 0, 'timestamp': 1127412000.0}),
('15', '6814', {'outcome': -1, 'timestamp': 1140552000.0}),
('17', '18', {'outcome': -1, 'timestamp': 885635999.999997}),
('17', '300', {'outcome': 0, 'timestamp': 888264000.000003}),
('17', '300', {'outcome': 0, 'timestamp': 919800000.000003}),
('17', '301', {'outcome': -1, 'timestamp': 888264000.000003}),
('17', '302', {'outcome': -1, 'timestamp': 888264000.000003}),
('17', '335', {'outcome': 1, 'timestamp': 919800000.000003}),
('17', '335', {'outcome': 1, 'timestamp': 1090620000.0}),
('17', '649', {'outcome': 0, 'timestamp': 919800000.000003}),
('17', '1221', {'outcome': 0, 'timestamp': 919800000.000003}),
('17', '1221', {'outcome': 1, 'timestamp': 951336000.000003}),
('17', '157', {'outcome': 0, 'timestamp': 927684000.000003}),
('17', '158', {'outcome': 0, 'timestamp': 927684000.000003}),
('17', '752', {'outcome': 0, 'timestamp': 927684000.000003}),
('17', '774', {'outcome': -1, 'timestamp': 935568000.000003}),
('17', '2460', {'outcome': 1, 'timestamp': 938196000.0}),
('17', '260', {'outcome': 0, 'timestamp': 948707999.999997}),
('17', '1103', {'outcome': 0, 'timestamp': 948707999.999997}),
('17', '1466', {'outcome': 0, 'timestamp': 948707999.999997}),
('17', '2737', {'outcome': 1, 'timestamp': 951336000.000003}),
('17', '334', {'outcome': -1, 'timestamp': 964475999.999997}),
('17', '334', {'outcome': 1, 'timestamp': 1064340000.0}),
('17', '186', {'outcome': 0, 'timestamp': 964475999.999997}),
('17', '155', {'outcome': 1, 'timestamp': 977616000.0}),
('17', '700', {'outcome': 1, 'timestamp': 996011999.999997}),
('17', '739', {'outcome': 0, 'timestamp': 996011999.999997}),
('17', '3262', {'outcome': -1, 'timestamp': 996011999.999997}),
('17', '92', {'outcome': 0, 'timestamp': 1001268000.0}),
('17', '1623', {'outcome': 1, 'timestamp': 1001268000.0}),
('17', '42', {'outcome': 0, 'timestamp': 1003896000.0}),
('17', '1160', {'outcome': 1, 'timestamp': 1003896000.0}),
('17', '2574', {'outcome': -1, 'timestamp': 1009152000.0}),
('17', '2170', {'outcome': -1, 'timestamp': 1009152000.0}),
('17', '74', {'outcome': 1, 'timestamp': 1009152000.0}),
('17', '1108', {'outcome': 0, 'timestamp': 1014408000.0}),
('17', '447', {'outcome': 0, 'timestamp': 1019664000.0}),
('17', '1548', {'outcome': -1, 'timestamp': 1019664000.0}),
('17', '2496', {'outcome': 0, 'timestamp': 1024920000.0}),
('17', '3577', {'outcome': 1, 'timestamp': 1024920000.0}),
('17', '2319', {'outcome': -1, 'timestamp': 1024920000.0}),
('17', '352', {'outcome': -1, 'timestamp': 1030176000.0}),
('17', '2984', {'outcome': 1, 'timestamp': 1030176000.0}),
('17', '573', {'outcome': 0, 'timestamp': 1030176000.0}),
('17', '228', {'outcome': 1, 'timestamp': 1030176000.0}),
('17', '164', {'outcome': -1, 'timestamp': 1040688000.0}),
('17', '449', {'outcome': 0, 'timestamp': 1053828000.0}),
('17', '4244', {'outcome': 1, 'timestamp': 1072224000.0}),
('17', '2667', {'outcome': 1, 'timestamp': 1072224000.0}),
```



```
('17', '720', {'outcome': -1, 'timestamp': 1072224000.0}),
('17', '3137', {'outcome': 1, 'timestamp': 1072224000.0}),
('17', '4173', {'outcome': 1, 'timestamp': 1090620000.0}),
('17', '165', {'outcome': 1, 'timestamp': 1090620000.0}),
('17', '327', {'outcome': 0, 'timestamp': 1090620000.0}),
('17', '53', {'outcome': -1, 'timestamp': 1103760000.0}),
('17', '939', {'outcome': 0, 'timestamp': 1132668000.0}),
('17', '2105', {'outcome': 0, 'timestamp': 1132668000.0}),
('17', '3934', {'outcome': -1, 'timestamp': 1137924000.0}),
('17', '3189', {'outcome': -1, 'timestamp': 1137924000.0}),
('18', '170', {'outcome': 0, 'timestamp': 885635999.999997}),
('18', '49', {'outcome': -1, 'timestamp': 898776000.0}),
('18', '49', {'outcome': -1, 'timestamp': 938196000.0}),
('18', '48', {'outcome': -1, 'timestamp': 898776000.0}),
('18', '1120', {'outcome': 1, 'timestamp': 932939999.999997}),
('18', '1055', {'outcome': -1, 'timestamp': 932939999.999997}),
('18', '2289', {'outcome': -1, 'timestamp': 932939999.999997}),
('18', '1283', {'outcome': 0, 'timestamp': 938196000.0}),
('18', '1522', {'outcome': 0, 'timestamp': 938196000.0}),
('18', '2537', {'outcome': 1, 'timestamp': 938196000.0}),
('18', '2458', {'outcome': 1, 'timestamp': 969732000.0}),
('18', '723', {'outcome': 1, 'timestamp': 969732000.0}),
('18', '2576', {'outcome': 1, 'timestamp': 1030176000.0}),
('18', '910', {'outcome': 1, 'timestamp': 1053828000.0}),
('18', '2570', {'outcome': 0, 'timestamp': 1064340000.0}),
('18', '754', {'outcome': 0, 'timestamp': 1064340000.0}),
('18', '3520', {'outcome': 0, 'timestamp': 1064340000.0}),
('18', '2468', {'outcome': -1, 'timestamp': 1095876000.0}),
('18', '2765', {'outcome': 1, 'timestamp': 1101132000.0}),
('18', '3201', {'outcome': 0, 'timestamp': 1101132000.0}),
('18', '1942', {'outcome': 1, 'timestamp': 1114272000.0}),
('18', '1942', {'outcome': -1, 'timestamp': 1140552000.0}),
('18', '5580', {'outcome': 1, 'timestamp': 1127412000.0}),
('18', '115', {'outcome': 1, 'timestamp': 1145808000.0}),
('18', '3785', {'outcome': -1, 'timestamp': 1145808000.0}),
('18', '197', {'outcome': -1, 'timestamp': 1145808000.0}),
('19', '7', {'outcome': 0, 'timestamp': 885635999.999997}),
('19', '8', {'outcome': 0, 'timestamp': 885635999.999997}),
('19', '20', {'outcome': -1, 'timestamp': 885635999.999997}),
('19', '21', {'outcome': -1, 'timestamp': 885635999.999997}),
('19', '22', {'outcome': 1, 'timestamp': 885635999.999997}),
('19', '61', {'outcome': 0, 'timestamp': 948707999.999997}),
('19', '2900', {'outcome': 0, 'timestamp': 974988000.000003}),
('19', '153', {'outcome': 0, 'timestamp': 974988000.000003}),
('19', '2249', {'outcome': 0, 'timestamp': 1114272000.0}),
('19', '156', {'outcome': 1, 'timestamp': 1137924000.0}),
('19', '220', {'outcome': 0, 'timestamp': 1137924000.0}),
('19', '1820', {'outcome': 0, 'timestamp': 1143180000.0}),
('19', '66', {'outcome': 0, 'timestamp': 1143180000.0}),
('19', '197', {'outcome': 1, 'timestamp': 1145808000.0}),
('20', '156', {'outcome': -1, 'timestamp': 885635999.999997}),
('20', '167', {'outcome': -1, 'timestamp': 885635999.999997}),
('20', '184', {'outcome': -1, 'timestamp': 885635999.999997}),
('20', '147', {'outcome': -1, 'timestamp': 1103760000.0}),
('20', '4540', {'outcome': -1, 'timestamp': 1137924000.0}),
('20', '6012', {'outcome': 0, 'timestamp': 1143180000.0}),
('21', '115', {'outcome': 0, 'timestamp': 885635999.999997}),
```

```
('21', '129', {'outcome': 0, 'timestamp': 890892000.0}),
('21', '531', {'outcome': 1, 'timestamp': 890892000.0}),
('21', '102', {'outcome': 1, 'timestamp': 890892000.0}),
('21', '366', {'outcome': 0, 'timestamp': 890892000.0}),
('21', '851', {'outcome': 0, 'timestamp': 896148000.000003}),
('21', '344', {'outcome': 1, 'timestamp': 898776000.0}),
('21', '279', {'outcome': 0, 'timestamp': 898776000.0}),
('21', '999', {'outcome': 1, 'timestamp': 898776000.0}),
('21', '142', {'outcome': 1, 'timestamp': 904032000.000003}),
('21', '503', {'outcome': 0, 'timestamp': 927684000.000003}),
('21', '257', {'outcome': 0, 'timestamp': 927684000.000003}),
('21', '257', {'outcome': 0, 'timestamp': 1011780000.0}),
('21', '545', {'outcome': 0, 'timestamp': 935568000.000003}),
('21', '640', {'outcome': -1, 'timestamp': 935568000.000003}),
('21', '1177', {'outcome': 0, 'timestamp': 946080000.0}),
('21', '1108', {'outcome': 0, 'timestamp': 1011780000.0}),
('21', '1820', {'outcome': 0, 'timestamp': 1019664000.0}),
('21', '720', {'outcome': 0, 'timestamp': 1019664000.0}),
('21', '696', {'outcome': 0, 'timestamp': 1027548000.0}),
('21', '2041', {'outcome': 1, 'timestamp': 1027548000.0}),
('21', '281', {'outcome': 0, 'timestamp': 1027548000.0}),
('21', '4284', {'outcome': 1, 'timestamp': 1103760000.0}),
('21', '725', {'outcome': 0, 'timestamp': 1103760000.0}),
('21', '56', {'outcome': 1, 'timestamp': 1103760000.0}),
('21', '4753', {'outcome': 1, 'timestamp': 1111644000.0}),
('21', '2476', {'outcome': 1, 'timestamp': 1127412000.0}),
('21', '2317', {'outcome': 0, 'timestamp': 1127412000.0}),
('21', '1428', {'outcome': 1, 'timestamp': 1137924000.0}),
('21', '153', {'outcome': 1, 'timestamp': 1137924000.0}),
('21', '3849', {'outcome': 0, 'timestamp': 1137924000.0}),
('21', '4686', {'outcome': 1, 'timestamp': 1140552000.0}),
('21', '4712', {'outcome': 1, 'timestamp': 1140552000.0}),
('21', '2796', {'outcome': 0, 'timestamp': 1140552000.0}),
('21', '3530', {'outcome': 0, 'timestamp': 1140552000.0}),
('21', '2676', {'outcome': 0, 'timestamp': 1143180000.0}),
('21', '246', {'outcome': 0, 'timestamp': 1143180000.0}),
('22', '20', {'outcome': -1, 'timestamp': 885635999.999997}),
('22', '217', {'outcome': 1, 'timestamp': 885635999.999997}),
('23', '1', {'outcome': -1, 'timestamp': 885635999.999997}),
('23', '2', {'outcome': -1, 'timestamp': 885635999.999997}),
('23', '3', {'outcome': 1, 'timestamp': 885635999.999997}),
('23', '1439', {'outcome': -1, 'timestamp': 922428000.0}),
('23', '1439', {'outcome': -1, 'timestamp': 993384000.0}),
('23', '1439', {'outcome': 1, 'timestamp': 1064340000.0}),
('23', '2008', {'outcome': 1, 'timestamp': 922428000.0}),
('23', '2008', {'outcome': 0, 'timestamp': 993384000.0}),
('23', '2008', {'outcome': 1, 'timestamp': 1064340000.0}),
('23', '172', {'outcome': -1, 'timestamp': 922428000.0}),
('23', '172', {'outcome': 0, 'timestamp': 993384000.0}),
('23', '90', {'outcome': 0, 'timestamp': 922428000.0}),
('23', '90', {'outcome': 0, 'timestamp': 1064340000.0}),
('23', '952', {'outcome': 0, 'timestamp': 922428000.0}),
('23', '352', {'outcome': -1, 'timestamp': 993384000.0}),
('23', '2718', {'outcome': 1, 'timestamp': 1011780000.0}),
('23', '165', {'outcome': -1, 'timestamp': 1048572000.0}),
('23', '605', {'outcome': 1, 'timestamp': 1048572000.0}),
('23', '2057', {'outcome': 1, 'timestamp': 1122156000.0}),
```

```
('23', '3473', {'outcome': 1, 'timestamp': 1122156000.0}),
('23', '4867', {'outcome': 1, 'timestamp': 1122156000.0}),
('23', '4078', {'outcome': 1, 'timestamp': 1137924000.0}),
('23', '232', {'outcome': -1, 'timestamp': 1137924000.0}),
('24', '25', {'outcome': 1, 'timestamp': 885635999.999997}),
('24', '890', {'outcome': 1, 'timestamp': 898776000.0}),
('24', '142', {'outcome': 1, 'timestamp': 898776000.0}),
('24', '21', {'outcome': 0, 'timestamp': 898776000.0}),
('24', '1314', {'outcome': 1, 'timestamp': 906660000.0}),
('24', '222', {'outcome': -1, 'timestamp': 911916000.000003}),
('24', '372', {'outcome': 0, 'timestamp': 911916000.000003}),
('24', '1118', {'outcome': 0, 'timestamp': 914544000.0}),
('24', '2009', {'outcome': 1, 'timestamp': 922428000.0}),
('24', '733', {'outcome': 1, 'timestamp': 922428000.0}),
('24', '462', {'outcome': -1, 'timestamp': 922428000.0}),
('24', '1882', {'outcome': 0, 'timestamp': 938196000.0}),
('24', '1025', {'outcome': 0, 'timestamp': 969732000.0}),
('24', '160', {'outcome': -1, 'timestamp': 1003896000.0}),
('24', '242', {'outcome': -1, 'timestamp': 1003896000.0}),
('24', '1281', {'outcome': 1, 'timestamp': 1035432000.0}),
('24', '1578', {'outcome': 0, 'timestamp': 1035432000.0}),
('24', '3290', {'outcome': 1, 'timestamp': 1038060000.0}),
('24', '2957', {'outcome': 1, 'timestamp': 1040688000.0}),
('24', '710', {'outcome': -1, 'timestamp': 1098504000.0}),
('24', '1636', {'outcome': -1, 'timestamp': 1098504000.0}),
('24', '2959', {'outcome': 1, 'timestamp': 1127412000.0}),
('24', '1652', {'outcome': 0, 'timestamp': 1130040000.0}),
('24', '849', {'outcome': 0, 'timestamp': 1130040000.0}),
('24', '364', {'outcome': 1, 'timestamp': 1130040000.0}),
('24', '2840', {'outcome': 1, 'timestamp': 1140552000.0}),
('24', '3814', {'outcome': 0, 'timestamp': 1140552000.0}),
('24', '2614', {'outcome': 0, 'timestamp': 1140552000.0}),
('24', '3150', {'outcome': 1, 'timestamp': 1145808000.0}),
('24', '204', {'outcome': 0, 'timestamp': 1145808000.0}),
('25', '30', {'outcome': -1, 'timestamp': 885635999.999997}),
('25', '93', {'outcome': -1, 'timestamp': 898776000.0}),
('25', '922', {'outcome': 1, 'timestamp': 898776000.0}),
('25', '316', {'outcome': -1, 'timestamp': 898776000.0}),
('25', '910', {'outcome': 1, 'timestamp': 930312000.0}),
('25', '315', {'outcome': 0, 'timestamp': 930312000.0}),
('25', '2268', {'outcome': 1, 'timestamp': 930312000.0}),
('25', '172', {'outcome': 1, 'timestamp': 1011780000.0}),
('25', '90', {'outcome': -1, 'timestamp': 1011780000.0}),
('25', '2416', {'outcome': 0, 'timestamp': 1011780000.0}),
('25', '115', {'outcome': 0, 'timestamp': 1038060000.0}),
('25', '115', {'outcome': -1, 'timestamp': 1069596000.0}),
('25', '2681', {'outcome': 0, 'timestamp': 1038060000.0}),
('25', '4018', {'outcome': 0, 'timestamp': 1053828000.0}),
('25', '2990', {'outcome': 1, 'timestamp': 1053828000.0}),
('25', '184', {'outcome': 0, 'timestamp': 1069596000.0}),
('25', '1125', {'outcome': -1, 'timestamp': 1093248000.0}),
('25', '1719', {'outcome': -1, 'timestamp': 1103760000.0}),
('25', '132', {'outcome': 0, 'timestamp': 1103760000.0}),
('25', '3743', {'outcome': 1, 'timestamp': 1106388000.0}),
('25', '268', {'outcome': 0, 'timestamp': 1106388000.0}),
('25', '215', {'outcome': 1, 'timestamp': 1122156000.0}),
('25', '4924', {'outcome': 0, 'timestamp': 1127412000.0}),
```

```
('25', '4215', {'outcome': 1, 'timestamp': 1127412000.0}),
('25', '3747', {'outcome': 1, 'timestamp': 1127412000.0}),
('25', '6059', {'outcome': 1, 'timestamp': 1132668000.0}),
('25', '5522', {'outcome': 1, 'timestamp': 1132668000.0}),
('25', '1957', {'outcome': 1, 'timestamp': 1132668000.0}),
('25', '1851', {'outcome': 1, 'timestamp': 1135296000.0}),
('25', '2673', {'outcome': -1, 'timestamp': 1135296000.0}),
('25', '4333', {'outcome': -1, 'timestamp': 1135296000.0}),
('25', '6424', {'outcome': 1, 'timestamp': 1137924000.0}),
('25', '1177', {'outcome': 0, 'timestamp': 1140552000.0}),
('25', '48', {'outcome': 1, 'timestamp': 1140552000.0}),
('25', '2152', {'outcome': 0, 'timestamp': 1143180000.0}),
('26', '27', {'outcome': -1, 'timestamp': 885635999.999997}),
('27', '222', {'outcome': 0, 'timestamp': 885635999.999997}),
('27', '107', {'outcome': 0, 'timestamp': 885635999.999997}),
('28', '29', {'outcome': 1, 'timestamp': 885635999.999997}),
('28', '411', {'outcome': -1, 'timestamp': 890892000.0}),
('28', '74', {'outcome': 0, 'timestamp': 890892000.0}),
('28', '261', {'outcome': 0, 'timestamp': 890892000.0}),
('28', '190', {'outcome': 0, 'timestamp': 890892000.0}),
('28', '412', {'outcome': 1, 'timestamp': 890892000.0}),
('28', '412', {'outcome': -1, 'timestamp': 1085364000.0}),
('28', '56', {'outcome': -1, 'timestamp': 890892000.0}),
('28', '891', {'outcome': 1, 'timestamp': 898776000.0}),
('28', '174', {'outcome': 1, 'timestamp': 917171999.999997}),
('28', '517', {'outcome': 0, 'timestamp': 917171999.999997}),
('28', '182', {'outcome': -1, 'timestamp': 917171999.999997}),
('28', '897', {'outcome': -1, 'timestamp': 998640000.000003}),
('28', '53', {'outcome': -1, 'timestamp': 998640000.000003}),
('28', '2995', {'outcome': 1, 'timestamp': 1017036000.0}),
('28', '2837', {'outcome': 1, 'timestamp': 1017036000.0}),
('28', '2805', {'outcome': 0, 'timestamp': 1085364000.0}),
('28', '432', {'outcome': 0, 'timestamp': 1137924000.0}),
('29', '131', {'outcome': 0, 'timestamp': 917171999.999997}),
('29', '77', {'outcome': 0, 'timestamp': 917171999.999997}),
('30', '31', {'outcome': 1, 'timestamp': 885635999.999997}),
('30', '651', {'outcome': 0, 'timestamp': 893519999.999997}),
('30', '653', {'outcome': 0, 'timestamp': 893519999.999997}),
('30', '653', {'outcome': 0, 'timestamp': 1051200000.0}),
('30', '653', {'outcome': 0, 'timestamp': 1098504000.0}),
('30', '653', {'outcome': 0, 'timestamp': 1114272000.0}),
('30', '653', {'outcome': 0, 'timestamp': 1132668000.0}),
('30', '654', {'outcome': 0, 'timestamp': 893519999.999997}),
('30', '654', {'outcome': 0, 'timestamp': 925055999.999997}),
('30', '654', {'outcome': 0, 'timestamp': 1051200000.0}),
('30', '654', {'outcome': 0, 'timestamp': 1145808000.0}),
('30', '256', {'outcome': 0, 'timestamp': 893519999.999997}),
('30', '54', {'outcome': 0, 'timestamp': 906660000.0}),
('30', '483', {'outcome': 0, 'timestamp': 906660000.0}),
('30', '502', {'outcome': 0, 'timestamp': 906660000.0}),
('30', '573', {'outcome': 0, 'timestamp': 906660000.0}),
('30', '232', {'outcome': 0, 'timestamp': 925055999.999997}),
('30', '2749', {'outcome': 1, 'timestamp': 951336000.000003}),
('30', '1963', {'outcome': 0, 'timestamp': 961848000.0}),
('30', '3519', {'outcome': 1, 'timestamp': 1011780000.0}),
('30', '21', {'outcome': 0, 'timestamp': 1011780000.0}),
('30', '3565', {'outcome': 0, 'timestamp': 1019664000.0}),
```

```
('30', '662', {'outcome': 0, 'timestamp': 1019664000.0}),
('30', '1366', {'outcome': 0, 'timestamp': 1019664000.0}),
('30', '663', {'outcome': 1, 'timestamp': 1019664000.0}),
('30', '663', {'outcome': 1, 'timestamp': 1048572000.0}),
('30', '227', {'outcome': 0, 'timestamp': 1032804000.0}),
('30', '952', {'outcome': 0, 'timestamp': 1032804000.0}),
('30', '449', {'outcome': -1, 'timestamp': 1032804000.0}),
('30', '3023', {'outcome': 0, 'timestamp': 1038060000.0}),
('30', '1857', {'outcome': 1, 'timestamp': 1038060000.0}),
('30', '3154', {'outcome': 1, 'timestamp': 1048572000.0}),
('30', '2823', {'outcome': 1, 'timestamp': 1048572000.0}),
('30', '643', {'outcome': -1, 'timestamp': 1059084000.0}),
('30', '1677', {'outcome': 0, 'timestamp': 1059084000.0}),
('30', '3989', {'outcome': -1, 'timestamp': 1066968000.0}),
('30', '421', {'outcome': 1, 'timestamp': 1066968000.0}),
('30', '2090', {'outcome': 0, 'timestamp': 1069596000.0}),
('30', '2090', {'outcome': 0, 'timestamp': 1145808000.0}),
('30', '330', {'outcome': 0, 'timestamp': 1069596000.0}),
('30', '674', {'outcome': 1, 'timestamp': 1074852000.0}),
('30', '789', {'outcome': 0, 'timestamp': 1098504000.0}),
('30', '789', {'outcome': -1, 'timestamp': 1114272000.0}),
('30', '3463', {'outcome': 1, 'timestamp': 1101132000.0}),
('30', '3463', {'outcome': 1, 'timestamp': 1132668000.0}),
('30', '874', {'outcome': 1, 'timestamp': 1101132000.0}),
('30', '4553', {'outcome': 1, 'timestamp': 1103760000.0}),
('30', '655', {'outcome': 0, 'timestamp': 1103760000.0}),
('30', '4569', {'outcome': 0, 'timestamp': 1103760000.0}),
('30', '3762', {'outcome': 1, 'timestamp': 1132668000.0}),
('30', '3457', {'outcome': 0, 'timestamp': 1140552000.0}),
('30', '1859', {'outcome': 1, 'timestamp': 1140552000.0}),
('30', '2796', {'outcome': -1, 'timestamp': 1145808000.0}),
('30', '272', {'outcome': 0, 'timestamp': 1145808000.0}),
('31', '1131', {'outcome': 0, 'timestamp': 914544000.0}),
('31', '1728', {'outcome': 0, 'timestamp': 914544000.0}),
('31', '333', {'outcome': -1, 'timestamp': 917171999.999997}),
('31', '1933', {'outcome': 0, 'timestamp': 917171999.999997}),
('31', '252', {'outcome': -1, 'timestamp': 953964000.0}),
('31', '330', {'outcome': -1, 'timestamp': 953964000.0}),
('31', '239', {'outcome': -1, 'timestamp': 953964000.0}),
('31', '2988', {'outcome': 0, 'timestamp': 972359999.999997}),
('31', '2009', {'outcome': 1, 'timestamp': 972359999.999997}),
('31', '2990', {'outcome': 1, 'timestamp': 972359999.999997}),
('31', '1081', {'outcome': 1, 'timestamp': 1124784000.0}),
('32', '33', {'outcome': 0, 'timestamp': 885635999.999997}),
('32', '34', {'outcome': 0, 'timestamp': 885635999.999997}),
('32', '35', {'outcome': 0, 'timestamp': 885635999.999997}),
('32', '36', {'outcome': 0, 'timestamp': 885635999.999997}),
('32', '37', {'outcome': 1, 'timestamp': 885635999.999997}),
('32', '884', {'outcome': 1, 'timestamp': 898776000.0}),
('32', '897', {'outcome': 0, 'timestamp': 898776000.0}),
('32', '898', {'outcome': 0, 'timestamp': 898776000.0}),
('32', '898', {'outcome': 0, 'timestamp': 1056456000.0}),
('32', '468', {'outcome': 1, 'timestamp': 898776000.0}),
('32', '899', {'outcome': 0, 'timestamp': 898776000.0}),
('32', '172', {'outcome': -1, 'timestamp': 906660000.0}),
('32', '61', {'outcome': 0, 'timestamp': 906660000.0}),
('32', '164', {'outcome': -1, 'timestamp': 906660000.0}),
```

```
('32', '1357', {'outcome': 1, 'timestamp': 906660000.0}),
('32', '922', {'outcome': 0, 'timestamp': 917171999.999997}),
('32', '276', {'outcome': 0, 'timestamp': 917171999.999997}),
('32', '803', {'outcome': 1, 'timestamp': 927684000.000003}),
('32', '803', {'outcome': 0, 'timestamp': 1116900000.0}),
('32', '483', {'outcome': 0, 'timestamp': 927684000.000003}),
('32', '440', {'outcome': 0, 'timestamp': 927684000.000003}),
('32', '886', {'outcome': 0, 'timestamp': 927684000.000003}),
('32', '886', {'outcome': 1, 'timestamp': 930312000.0}),
('32', '676', {'outcome': 1, 'timestamp': 927684000.000003}),
('32', '997', {'outcome': 0, 'timestamp': 969732000.0}),
('32', '88', {'outcome': 0, 'timestamp': 977616000.0}),
('32', '2184', {'outcome': 1, 'timestamp': 993384000.0}),
('32', '3225', {'outcome': 0, 'timestamp': 993384000.0}),
('32', '2269', {'outcome': 1, 'timestamp': 993384000.0}),
('32', '401', {'outcome': 1, 'timestamp': 1003896000.0}),
('32', '960', {'outcome': 0, 'timestamp': 1003896000.0}),
('32', '2079', {'outcome': 0, 'timestamp': 1009152000.0}),
('32', '1557', {'outcome': 0, 'timestamp': 1009152000.0}),
('32', '2230', {'outcome': 1, 'timestamp': 1014408000.0}),
('32', '320', {'outcome': 0, 'timestamp': 1014408000.0}),
('32', '1862', {'outcome': -1, 'timestamp': 1014408000.0}),
('32', '2594', {'outcome': -1, 'timestamp': 1027548000.0}),
('32', '1134', {'outcome': 0, 'timestamp': 1027548000.0}),
('32', '641', {'outcome': -1, 'timestamp': 1027548000.0}),
('32', '1099', {'outcome': 0, 'timestamp': 1030176000.0}),
('32', '3853', {'outcome': 1, 'timestamp': 1035432000.0}),
('32', '2986', {'outcome': 0, 'timestamp': 1040688000.0}),
('32', '471', {'outcome': 1, 'timestamp': 1040688000.0}),
('32', '3194', {'outcome': 1, 'timestamp': 1040688000.0}),
('32', '1466', {'outcome': 0, 'timestamp': 1040688000.0}),
('32', '3679', {'outcome': 0, 'timestamp': 1056456000.0}),
('32', '834', {'outcome': 1, 'timestamp': 1056456000.0}),
('32', '496', {'outcome': -1, 'timestamp': 1056456000.0}),
('32', '496', {'outcome': 0, 'timestamp': 1132668000.0}),
('32', '4214', {'outcome': 1, 'timestamp': 1066968000.0}),
('32', '3924', {'outcome': 1, 'timestamp': 1072224000.0}),
('32', '2667', {'outcome': 1, 'timestamp': 1072224000.0}),
('32', '670', {'outcome': 1, 'timestamp': 1087992000.0}),
('32', '670', {'outcome': 0, 'timestamp': 1124784000.0}),
('32', '3548', {'outcome': 0, 'timestamp': 1087992000.0}),
('32', '1232', {'outcome': 0, 'timestamp': 1087992000.0}),
('32', '98', {'outcome': -1, 'timestamp': 1093248000.0}),
('32', '537', {'outcome': -1, 'timestamp': 1093248000.0}),
('32', '959', {'outcome': 0, 'timestamp': 1093248000.0}),
('32', '4445', {'outcome': 1, 'timestamp': 1095876000.0}),
('32', '4445', {'outcome': 0, 'timestamp': 1119528000.0}),
('32', '3101', {'outcome': -1, 'timestamp': 1103760000.0}),
('32', '188', {'outcome': 0, 'timestamp': 1103760000.0}),
('32', '928', {'outcome': 1, 'timestamp': 1116900000.0}),
('32', '153', {'outcome': 1, 'timestamp': 1119528000.0}),
('32', '259', {'outcome': 0, 'timestamp': 1124784000.0}),
('32', '2131', {'outcome': 1, 'timestamp': 1124784000.0}),
('32', '4368', {'outcome': 1, 'timestamp': 1135296000.0}),
('32', '189', {'outcome': 0, 'timestamp': 1135296000.0}),
('32', '3925', {'outcome': 0, 'timestamp': 1140552000.0}),
('32', '3112', {'outcome': 1, 'timestamp': 1140552000.0}),
```

```
('32', '4060', {'outcome': 0, 'timestamp': 1140552000.0}),
('32', '166', {'outcome': 1, 'timestamp': 1143180000.0}),
('33', '42', {'outcome': 0, 'timestamp': 885635999.999997}),
('33', '43', {'outcome': 0, 'timestamp': 885635999.999997}),
('33', '773', {'outcome': 0, 'timestamp': 898776000.0}),
('33', '900', {'outcome': 1, 'timestamp': 898776000.0}),
('33', '901', {'outcome': 0, 'timestamp': 898776000.0}),
('33', '902', {'outcome': 0, 'timestamp': 898776000.0}),
('33', '468', {'outcome': 0, 'timestamp': 904032000.000003}),
('33', '79', {'outcome': 1, 'timestamp': 904032000.000003}),
('33', '200', {'outcome': 0, 'timestamp': 911916000.000003}),
('33', '200', {'outcome': 0, 'timestamp': 1124784000.0}),
('33', '1308', {'outcome': -1, 'timestamp': 911916000.000003}),
('33', '75', {'outcome': 1, 'timestamp': 917171999.999997}),
('33', '922', {'outcome': 1, 'timestamp': 917171999.999997}),
('33', '61', {'outcome': -1, 'timestamp': 917171999.999997}),
('33', '188', {'outcome': 0, 'timestamp': 917171999.999997}),
('33', '1194', {'outcome': 0, 'timestamp': 925055999.999997}),
('33', '2061', {'outcome': 1, 'timestamp': 925055999.999997}),
('33', '2067', {'outcome': 0, 'timestamp': 935568000.000003}),
('33', '1608', {'outcome': 1, 'timestamp': 935568000.000003}),
('33', '2380', {'outcome': 1, 'timestamp': 1022292000.0}),
('33', '2380', {'outcome': 1, 'timestamp': 1093248000.0}),
('33', '1099', {'outcome': -1, 'timestamp': 1022292000.0}),
('33', '2003', {'outcome': 1, 'timestamp': 1064340000.0}),
('33', '201', {'outcome': -1, 'timestamp': 1064340000.0}),
('33', '2138', {'outcome': 1, 'timestamp': 1064340000.0}),
('33', '1025', {'outcome': -1, 'timestamp': 1093248000.0}),
('33', '1796', {'outcome': 1, 'timestamp': 1093248000.0}),
('33', '3392', {'outcome': 1, 'timestamp': 1132668000.0}),
('34', '47', {'outcome': 0, 'timestamp': 885635999.999997}),
('34', '48', {'outcome': 0, 'timestamp': 885635999.999997}),
('34', '890', {'outcome': 1, 'timestamp': 898776000.0}),
('34', '278', {'outcome': 0, 'timestamp': 898776000.0}),
('34', '1760', {'outcome': 1, 'timestamp': 932939999.999997}),
('34', '1177', {'outcome': 0, 'timestamp': 948707999.999997}),
('34', '522', {'outcome': 1, 'timestamp': 948707999.999997}),
('34', '931', {'outcome': 0, 'timestamp': 948707999.999997}),
('34', '423', {'outcome': 0, 'timestamp': 948707999.999997}),
('34', '64', {'outcome': 0, 'timestamp': 948707999.999997}),
('34', '64', {'outcome': 0, 'timestamp': 1132668000.0}),
('34', '256', {'outcome': 0, 'timestamp': 948707999.999997}),
('34', '266', {'outcome': 1, 'timestamp': 961848000.0}),
('34', '266', {'outcome': 1, 'timestamp': 1143180000.0}),
('34', '265', {'outcome': 0, 'timestamp': 961848000.0}),
('34', '1327', {'outcome': 1, 'timestamp': 990756000.000003}),
('34', '965', {'outcome': 1, 'timestamp': 990756000.000003}),
('34', '25', {'outcome': 1, 'timestamp': 1038060000.0}),
('34', '25', {'outcome': 0, 'timestamp': 1101132000.0}),
('34', '234', {'outcome': 0, 'timestamp': 1038060000.0}),
('34', '268', {'outcome': 0, 'timestamp': 1038060000.0}),
('34', '14', {'outcome': 0, 'timestamp': 1074852000.0}),
('34', '215', {'outcome': 1, 'timestamp': 1122156000.0}),
('34', '1944', {'outcome': 1, 'timestamp': 1132668000.0}),
('34', '267', {'outcome': 1, 'timestamp': 1135296000.0}),
('35', '12', {'outcome': 1, 'timestamp': 885635999.999997}),
('35', '163', {'outcome': 0, 'timestamp': 885635999.999997}),
```

```
('35', '2724', {'outcome': 1, 'timestamp': 948707999.999997}),
('35', '2170', {'outcome': 1, 'timestamp': 969732000.0}),
('35', '1809', {'outcome': 0, 'timestamp': 1003896000.0}),
('35', '2930', {'outcome': 1, 'timestamp': 1003896000.0}),
('35', '2317', {'outcome': 0, 'timestamp': 1003896000.0}),
('35', '1675', {'outcome': 1, 'timestamp': 1032804000.0}),
('35', '3799', {'outcome': 1, 'timestamp': 1032804000.0}),
('36', '207', {'outcome': 0, 'timestamp': 885635999.999997}),
('36', '207', {'outcome': 0, 'timestamp': 917171999.999997}),
('36', '441', {'outcome': 0, 'timestamp': 893519999.999997}),
('36', '188', {'outcome': -1, 'timestamp': 893519999.999997}),
('36', '775', {'outcome': -1, 'timestamp': 893519999.999997}),
('36', '775', {'outcome': 0, 'timestamp': 1082736000.0}),
('36', '776', {'outcome': 1, 'timestamp': 893519999.999997}),
('36', '24', {'outcome': 0, 'timestamp': 898776000.0}),
('36', '728', {'outcome': 0, 'timestamp': 898776000.0}),
('36', '573', {'outcome': -1, 'timestamp': 898776000.0}),
('36', '573', {'outcome': 0, 'timestamp': 988127999.999997}),
('36', '919', {'outcome': 1, 'timestamp': 898776000.0}),
('36', '579', {'outcome': 0, 'timestamp': 898776000.0}),
('36', '1194', {'outcome': 1, 'timestamp': 904032000.000003}),
('36', '1173', {'outcome': 0, 'timestamp': 904032000.000003}),
('36', '883', {'outcome': 0, 'timestamp': 904032000.000003}),
('36', '686', {'outcome': 0, 'timestamp': 906660000.0}),
('36', '1658', {'outcome': 1, 'timestamp': 906660000.0}),
('36', '1526', {'outcome': 1, 'timestamp': 906660000.0}),
('36', '163', {'outcome': 0, 'timestamp': 917171999.999997}),
('36', '956', {'outcome': 0, 'timestamp': 917171999.999997}),
('36', '201', {'outcome': 0, 'timestamp': 940823999.999997}),
('36', '1327', {'outcome': 0, 'timestamp': 980243999.999997}),
('36', '2598', {'outcome': 0, 'timestamp': 980243999.999997}),
('36', '112', {'outcome': 0, 'timestamp': 988127999.999997}),
('36', '2631', {'outcome': 1, 'timestamp': 988127999.999997}),
('36', '465', {'outcome': 0, 'timestamp': 1001268000.0}),
('36', '237', {'outcome': 1, 'timestamp': 1001268000.0}),
('36', '1827', {'outcome': 0, 'timestamp': 1038060000.0}),
('36', '3456', {'outcome': 1, 'timestamp': 1038060000.0}),
('36', '104', {'outcome': 1, 'timestamp': 1038060000.0}),
('36', '635', {'outcome': 0, 'timestamp': 1043316000.0}),
('36', '902', {'outcome': 0, 'timestamp': 1064340000.0}),
('36', '721', {'outcome': 1, 'timestamp': 1080108000.0}),
('36', '519', {'outcome': -1, 'timestamp': 1080108000.0}),
('36', '3608', {'outcome': 1, 'timestamp': 1080108000.0}),
('36', '287', {'outcome': 1, 'timestamp': 1080108000.0}),
('36', '3926', {'outcome': 0, 'timestamp': 1082736000.0}),
('36', '3448', {'outcome': 1, 'timestamp': 1082736000.0}),
('36', '741', {'outcome': 0, 'timestamp': 1082736000.0}),
('36', '4455', {'outcome': 1, 'timestamp': 1095876000.0}),
('36', '2032', {'outcome': 0, 'timestamp': 1095876000.0}),
('36', '220', {'outcome': 1, 'timestamp': 1106388000.0}),
('36', '1719', {'outcome': 0, 'timestamp': 1106388000.0}),
('36', '259', {'outcome': 0, 'timestamp': 1106388000.0}),
('36', '476', {'outcome': -1, 'timestamp': 1111644000.0}),
('36', '4215', {'outcome': 1, 'timestamp': 1111644000.0}),
('36', '1117', {'outcome': 0, 'timestamp': 1111644000.0}),
('36', '77', {'outcome': 1, 'timestamp': 1114272000.0}),
('36', '89', {'outcome': 0, 'timestamp': 1127412000.0}),
```



```
( '36', '1191', {'outcome': 0, 'timestamp': 1127412000.0}),
( '36', '251', {'outcome': 1, 'timestamp': 1127412000.0}),
( '36', '385', {'outcome': 1, 'timestamp': 1127412000.0}),
( '36', '6053', {'outcome': 1, 'timestamp': 1132668000.0}),
( '36', '266', {'outcome': 1, 'timestamp': 1137924000.0}),
( '36', '6131', {'outcome': 0, 'timestamp': 1137924000.0}),
( '36', '41', {'outcome': 0, 'timestamp': 1140552000.0}),
( '36', '4018', {'outcome': 1, 'timestamp': 1143180000.0}),
( '37', '35', {'outcome': 0, 'timestamp': 885635999.999997}),
( '37', '1049', {'outcome': 1, 'timestamp': 917171999.999997}),
( '37', '275', {'outcome': -1, 'timestamp': 948707999.999997}),
( '37', '72', {'outcome': 0, 'timestamp': 1009152000.0}),
( '37', '2894', {'outcome': -1, 'timestamp': 1032804000.0}),
( '37', '1178', {'outcome': 0, 'timestamp': 1032804000.0}),
( '37', '115', {'outcome': 0, 'timestamp': 1090620000.0}),
( '37', '12', {'outcome': 1, 'timestamp': 1090620000.0}),
( '37', '199', {'outcome': 0, 'timestamp': 1090620000.0}),
( '37', '910', {'outcome': 0, 'timestamp': 1122156000.0}),
( '37', '257', {'outcome': 0, 'timestamp': 1122156000.0}),
( '37', '79', {'outcome': -1, 'timestamp': 1122156000.0}),
( '37', '64', {'outcome': -1, 'timestamp': 1122156000.0}),
( '37', '4870', {'outcome': 1, 'timestamp': 1137924000.0}),
( '37', '5350', {'outcome': 1, 'timestamp': 1137924000.0}),
( '37', '3147', {'outcome': 0, 'timestamp': 1140552000.0}),
( '37', '458', {'outcome': -1, 'timestamp': 1140552000.0}),
( '38', '39', {'outcome': 1, 'timestamp': 885635999.999997}),
( '38', '40', {'outcome': 1, 'timestamp': 885635999.999997}),
( '38', '41', {'outcome': -1, 'timestamp': 885635999.999997}),
( '38', '3101', {'outcome': -1, 'timestamp': 985500000.0}),
( '38', '84', {'outcome': -1, 'timestamp': 985500000.0}),
( '38', '3104', {'outcome': 1, 'timestamp': 985500000.0}),
...]
```

Looking at the **degree** of each node, we can see **how many games each person played**. A dictionary is returned where each key is the player, and each value is the number of games played.

```
In [14]: games_played = chess.degree()  
games_played
```

```
Out[14]: {'1': 48,  
          '2': 112,  
          '3': 85,  
          '4': 12,  
          '5': 18,  
          '6': 95,  
          '7': 9,  
          '8': 20,  
          '9': 142,  
          '10': 4,  
          '11': 2,  
          '12': 70,  
          '13': 148,  
          '14': 153,  
          '15': 23,  
          '16': 3,  
          '17': 115,  
          '18': 45,  
          '19': 27,  
          '20': 12,  
          '21': 65,  
          '22': 6,  
          '23': 41,  
          '24': 72,  
          '25': 72,  
          '26': 2,  
          '27': 3,  
          '28': 41,  
          '29': 8,  
          '30': 115,  
          '31': 23,  
          '32': 146,  
          '33': 67,  
          '34': 52,  
          '35': 22,  
          '36': 118,  
          '37': 30,  
          '38': 39,  
          '39': 79,  
          '40': 26,  
          '41': 71,  
          '42': 200,  
          '43': 10,  
          '44': 77,  
          '45': 74,  
          '46': 41,  
          '47': 92,  
          '48': 45,  
          '49': 58,  
          '50': 9,  
          '51': 90,  
          '52': 4,  
          '53': 167,  
          '54': 80,  
          '55': 35,  
          '56': 87,  
          '57': 48,
```

'58': 29,
'59': 111,
'60': 43,
'61': 107,
'62': 74,
'63': 7,
'64': 171,
'65': 43,
'66': 203,
'67': 39,
'68': 23,
'69': 4,
'70': 15,
'71': 55,
'72': 10,
'73': 19,
'74': 144,
'75': 22,
'76': 20,
'77': 71,
'78': 18,
'79': 122,
'80': 4,
'81': 29,
'82': 29,
'83': 58,
'84': 32,
'85': 35,
'86': 13,
'87': 52,
'88': 61,
'89': 123,
'90': 58,
'91': 100,
'92': 257,
'93': 24,
'94': 10,
'95': 14,
'96': 41,
'97': 25,
'98': 276,
'99': 28,
'100': 20,
'101': 49,
'102': 31,
'103': 8,
'104': 95,
'105': 6,
'106': 18,
'107': 14,
'108': 75,
'109': 100,
'110': 12,
'111': 42,
'112': 208,
'113': 142,
'114': 96,

'115' : 87,
'116' : 14,
'117' : 26,
'118' : 51,
'119' : 10,
'120' : 52,
'121' : 36,
'122' : 106,
'123' : 28,
'124' : 138,
'125' : 38,
'126' : 85,
'127' : 166,
'128' : 118,
'129' : 82,
'130' : 211,
'131' : 66,
'132' : 207,
'133' : 73,
'134' : 3,
'135' : 13,
'136' : 9,
'137' : 24,
'138' : 108,
'139' : 44,
'140' : 38,
'141' : 10,
'142' : 65,
'143' : 62,
'144' : 21,
'145' : 64,
'146' : 18,
'147' : 66,
'148' : 111,
'149' : 78,
'150' : 20,
'151' : 51,
'152' : 69,
'153' : 91,
'154' : 2,
'155' : 35,
'156' : 63,
'157' : 110,
'158' : 93,
'159' : 53,
'160' : 103,
'161' : 73,
'162' : 65,
'163' : 29,
'164' : 150,
'165' : 140,
'166' : 87,
'167' : 16,
'168' : 8,
'169' : 30,
'170' : 15,
'171' : 114,

'172' : 126,
'173' : 40,
'174' : 36,
'175' : 22,
'176' : 6,
'177' : 39,
'178' : 88,
'179' : 48,
'180' : 25,
'181' : 8,
'182' : 39,
'183' : 43,
'184' : 37,
'185' : 82,
'186' : 52,
'187' : 99,
'188' : 180,
'189' : 131,
'190' : 36,
'191' : 15,
'192' : 11,
'193' : 108,
'194' : 21,
'195' : 49,
'196' : 24,
'197' : 88,
'198' : 7,
'199' : 89,
'200' : 127,
'201' : 99,
'202' : 127,
'203' : 20,
'204' : 37,
'205' : 11,
'206' : 4,
'207' : 185,
'208' : 8,
'209' : 2,
'210' : 4,
'211' : 194,
'212' : 28,
'213' : 21,
'214' : 30,
'215' : 20,
'216' : 22,
'217' : 5,
'218' : 9,
'219' : 81,
'220' : 54,
'221' : 14,
'222' : 37,
'223' : 93,
'224' : 100,
'225' : 7,
'226' : 71,
'227' : 112,
'228' : 146,

'229' : 60,
'230' : 4,
'231' : 41,
'232' : 64,
'233' : 22,
'234' : 80,
'235' : 62,
'236' : 36,
'237' : 197,
'238' : 125,
'239' : 88,
'240' : 17,
'241' : 31,
'242' : 138,
'243' : 3,
'244' : 13,
'245' : 8,
'246' : 104,
'247' : 29,
'248' : 83,
'249' : 8,
'250' : 40,
'251' : 191,
'252' : 76,
'253' : 15,
'254' : 24,
'255' : 58,
'256' : 148,
'257' : 149,
'258' : 46,
'259' : 107,
'260' : 78,
'261' : 86,
'262' : 21,
'263' : 34,
'264' : 88,
'265' : 21,
'266' : 39,
'267' : 21,
'268' : 45,
'269' : 85,
'270' : 63,
'271' : 1,
'272' : 140,
'273' : 1,
'274' : 2,
'275' : 192,
'276' : 21,
'277' : 54,
'278' : 154,
'279' : 14,
'280' : 129,
'281' : 64,
'282' : 4,
'283' : 34,
'284' : 11,
'285' : 146,

'286' : 15,
'287' : 107,
'288' : 10,
'289' : 41,
'290' : 1,
'291' : 24,
'292' : 1,
'293' : 2,
'294' : 13,
'295' : 46,
'296' : 21,
'297' : 7,
'298' : 28,
'299' : 122,
'300' : 112,
'301' : 47,
'302' : 61,
'303' : 39,
'304' : 38,
'305' : 17,
'306' : 37,
'307' : 16,
'308' : 28,
'309' : 19,
'310' : 107,
'311' : 4,
'312' : 50,
'313' : 50,
'314' : 79,
'315' : 21,
'316' : 36,
'317' : 16,
'318' : 47,
'319' : 9,
'320' : 44,
'321' : 28,
'322' : 54,
'323' : 20,
'324' : 27,
'325' : 26,
'326' : 14,
'327' : 74,
'328' : 78,
'329' : 15,
'330' : 272,
'331' : 7,
'332' : 37,
'333' : 78,
'334' : 179,
'335' : 67,
'336' : 35,
'337' : 124,
'338' : 31,
'339' : 113,
'340' : 59,
'341' : 18,
'342' : 9,

'343' : 4,
'344' : 26,
'345' : 41,
'346' : 7,
'347' : 26,
'348' : 4,
'349' : 26,
'350' : 9,
'351' : 8,
'352' : 149,
'353' : 26,
'354' : 37,
'355' : 55,
'356' : 42,
'357' : 119,
'358' : 45,
'359' : 13,
'360' : 66,
'361' : 9,
'362' : 64,
'363' : 16,
'364' : 51,
'365' : 20,
'366' : 57,
'367' : 9,
'368' : 2,
'369' : 23,
'370' : 26,
'371' : 258,
'372' : 72,
'373' : 67,
'374' : 6,
'375' : 39,
'376' : 75,
'377' : 2,
'378' : 7,
'379' : 3,
'380' : 4,
'381' : 9,
'382' : 9,
'383' : 152,
'384' : 70,
'385' : 113,
'386' : 2,
'387' : 187,
'388' : 23,
'389' : 5,
'390' : 5,
'391' : 9,
'392' : 59,
'393' : 130,
'394' : 42,
'395' : 35,
'396' : 86,
'397' : 17,
'398' : 23,
'399' : 52,

'400' : 180,
'401' : 17,
'402' : 18,
'403' : 38,
'404' : 11,
'405' : 13,
'406' : 3,
'407' : 29,
'408' : 42,
'409' : 45,
'410' : 9,
'411' : 9,
'412' : 141,
'413' : 6,
'414' : 92,
'415' : 34,
'416' : 95,
'417' : 4,
'418' : 78,
'419' : 26,
'420' : 3,
'421' : 150,
'422' : 3,
'423' : 92,
'424' : 10,
'425' : 21,
'426' : 17,
'427' : 4,
'428' : 4,
'429' : 9,
'430' : 10,
'431' : 8,
'432' : 46,
'433' : 23,
'434' : 3,
'435' : 69,
'436' : 117,
'437' : 12,
'438' : 4,
'439' : 88,
'440' : 171,
'441' : 46,
'442' : 14,
'443' : 83,
'444' : 78,
'445' : 62,
'446' : 112,
'447' : 201,
'448' : 116,
'449' : 126,
'450' : 30,
'451' : 125,
'452' : 96,
'453' : 94,
'454' : 22,
'455' : 252,
'456' : 221,

'457' : 45,
'458' : 54,
'459' : 62,
'460' : 76,
'461' : 280,
'462' : 196,
'463' : 45,
'464' : 24,
'465' : 161,
'466' : 96,
'467' : 270,
'468' : 130,
'469' : 6,
'470' : 15,
'471' : 61,
'472' : 22,
'473' : 59,
'474' : 4,
'475' : 26,
'476' : 113,
'477' : 87,
'478' : 21,
'479' : 26,
'480' : 58,
'481' : 30,
'482' : 121,
'483' : 92,
'484' : 23,
'485' : 66,
'486' : 42,
'487' : 132,
'488' : 46,
'489' : 3,
'490' : 15,
'491' : 42,
'492' : 48,
'493' : 16,
'494' : 23,
'495' : 38,
'496' : 136,
'497' : 112,
'498' : 17,
'499' : 61,
'500' : 148,
'501' : 8,
'502' : 64,
'503' : 96,
'504' : 25,
'505' : 18,
'506' : 2,
'507' : 68,
'508' : 97,
'509' : 17,
'510' : 131,
'511' : 28,
'512' : 4,
'513' : 31,

'514' : 71,
'515' : 33,
'516' : 131,
'517' : 14,
'518' : 3,
'519' : 178,
'520' : 14,
'521' : 53,
'522' : 81,
'523' : 50,
'524' : 15,
'525' : 17,
'526' : 22,
'527' : 7,
'528' : 12,
'529' : 5,
'530' : 56,
'531' : 3,
'532' : 4,
'533' : 3,
'534' : 20,
'535' : 12,
'536' : 89,
'537' : 162,
'538' : 112,
'539' : 53,
'540' : 25,
'541' : 19,
'542' : 53,
'543' : 142,
'544' : 6,
'545' : 158,
'546' : 51,
'547' : 26,
'548' : 18,
'549' : 51,
'550' : 9,
'551' : 15,
'552' : 48,
'553' : 4,
'554' : 5,
'555' : 8,
'556' : 21,
'557' : 125,
'558' : 17,
'559' : 1,
'560' : 125,
'561' : 41,
'562' : 36,
'563' : 178,
'564' : 8,
'565' : 10,
'566' : 78,
'567' : 17,
'568' : 29,
'569' : 52,
'570' : 10,

'571': 4,
'572': 28,
'573': 216,
'574': 112,
'575': 4,
'576': 26,
'577': 92,
'578': 24,
'579': 155,
'580': 207,
'581': 21,
'582': 19,
'583': 78,
'584': 5,
'585': 9,
'586': 171,
'587': 9,
'588': 37,
'589': 49,
'590': 21,
'591': 1,
'592': 2,
'593': 45,
'594': 4,
'595': 136,
'596': 26,
'597': 6,
'598': 2,
'599': 16,
'600': 38,
'601': 65,
'602': 41,
'603': 20,
'604': 23,
'605': 137,
'606': 8,
'607': 15,
'608': 17,
'609': 83,
'610': 193,
'611': 3,
'612': 31,
'613': 5,
'614': 18,
'615': 17,
'616': 5,
'617': 1,
'618': 2,
'619': 1,
'620': 13,
'621': 164,
'622': 82,
'623': 211,
'624': 7,
'625': 6,
'626': 10,
'627': 38,

'628': 8,
'629': 8,
'630': 3,
'631': 9,
'632': 15,
'633': 46,
'634': 33,
'635': 155,
'636': 27,
'637': 192,
'638': 52,
'639': 43,
'640': 60,
'641': 74,
'642': 47,
'643': 130,
'644': 57,
'645': 6,
'646': 71,
'647': 66,
'648': 52,
'649': 105,
'650': 3,
'651': 100,
'652': 90,
'653': 158,
'654': 131,
'655': 61,
'656': 132,
'657': 48,
'658': 33,
'659': 255,
'660': 22,
'661': 83,
'662': 54,
'663': 54,
'664': 99,
'665': 11,
'666': 7,
'667': 9,
'668': 43,
'669': 20,
'670': 93,
'671': 42,
'672': 27,
'673': 232,
'674': 86,
'675': 10,
'676': 54,
'677': 15,
'678': 3,
'679': 1,
'680': 42,
'681': 57,
'682': 15,
'683': 13,
'684': 126,

'685' : 147,
'686' : 36,
'687' : 85,
'688' : 13,
'689' : 39,
'690' : 59,
'691' : 59,
'692' : 123,
'693' : 15,
'694' : 14,
'695' : 11,
'696' : 34,
'697' : 24,
'698' : 3,
'699' : 6,
'700' : 41,
'701' : 42,
'702' : 8,
'703' : 27,
'704' : 75,
'705' : 18,
'706' : 60,
'707' : 62,
'708' : 13,
'709' : 24,
'710' : 84,
'711' : 9,
'712' : 110,
'713' : 61,
'714' : 59,
'715' : 56,
'716' : 29,
'717' : 11,
'718' : 4,
'719' : 28,
'720' : 191,
'721' : 120,
'722' : 39,
'723' : 25,
'724' : 25,
'725' : 134,
'726' : 50,
'727' : 6,
'728' : 118,
'729' : 1,
'730' : 33,
'731' : 195,
'732' : 1,
'733' : 27,
'734' : 53,
'735' : 2,
'736' : 188,
'737' : 37,
'738' : 18,
'739' : 51,
'740' : 27,
'741' : 166,

'742' : 155,
'743' : 28,
'744' : 32,
'745' : 13,
'746' : 39,
'747' : 52,
'748' : 114,
'749' : 53,
'750' : 7,
'751' : 2,
'752' : 61,
'753' : 87,
'754' : 34,
'755' : 21,
'756' : 27,
'757' : 18,
'758' : 10,
'759' : 85,
'760' : 5,
'761' : 30,
'762' : 17,
'763' : 29,
'764' : 18,
'765' : 34,
'766' : 8,
'767' : 24,
'768' : 4,
'769' : 9,
'770' : 24,
'771' : 35,
'772' : 40,
'773' : 49,
'774' : 24,
'775' : 48,
'776' : 9,
'777' : 67,
'778' : 130,
'779' : 4,
'780' : 11,
'781' : 4,
'782' : 8,
'783' : 50,
'784' : 28,
'785' : 19,
'786' : 8,
'787' : 78,
'788' : 45,
'789' : 155,
'790' : 47,
'791' : 17,
'792' : 46,
'793' : 46,
'794' : 7,
'795' : 17,
'796' : 14,
'797' : 30,
'798' : 126,

'799' : 24,
'800' : 19,
'801' : 185,
'802' : 10,
'803' : 164,
'804' : 1,
'805' : 7,
'806' : 63,
'807' : 87,
'808' : 68,
'809' : 16,
'810' : 20,
'811' : 6,
'812' : 1,
'813' : 13,
'814' : 3,
'815' : 57,
'816' : 54,
'817' : 49,
'818' : 60,
'819' : 57,
'820' : 13,
'821' : 4,
'822' : 57,
'823' : 3,
'824' : 73,
'825' : 80,
'826' : 63,
'827' : 84,
'828' : 38,
'829' : 25,
'830' : 46,
'831' : 109,
'832' : 30,
'833' : 184,
'834' : 36,
'835' : 5,
'836' : 6,
'837' : 14,
'838' : 63,
'839' : 12,
'840' : 43,
'841' : 17,
'842' : 61,
'843' : 8,
'844' : 31,
'845' : 3,
'846' : 6,
'847' : 21,
'848' : 78,
'849' : 129,
'850' : 2,
'851' : 33,
'852' : 42,
'853' : 22,
'854' : 7,
'855' : 18,

'856': 6,
'857': 10,
'858': 4,
'859': 37,
'860': 33,
'861': 28,
'862': 139,
'863': 39,
'864': 35,
'865': 13,
'866': 5,
'867': 14,
'868': 36,
'869': 6,
'870': 21,
'871': 28,
'872': 70,
'873': 20,
'874': 42,
'875': 9,
'876': 28,
'877': 8,
'878': 11,
'879': 46,
'880': 117,
'881': 6,
'882': 78,
'883': 78,
'884': 9,
'885': 102,
'886': 39,
'887': 6,
'888': 12,
'889': 11,
'890': 9,
'891': 56,
'892': 17,
'893': 37,
'894': 2,
'895': 36,
'896': 14,
'897': 66,
'898': 36,
'899': 12,
'900': 43,
'901': 29,
'902': 45,
'903': 2,
'904': 20,
'905': 5,
'906': 11,
'907': 19,
'908': 25,
'909': 5,
'910': 92,
'911': 3,
'912': 3,

'913' : 195,
'914' : 82,
'915' : 25,
'916' : 5,
'917' : 14,
'918' : 17,
'919' : 6,
'920' : 29,
'921' : 47,
'922' : 15,
'923' : 5,
'924' : 15,
'925' : 44,
'926' : 26,
'927' : 26,
'928' : 31,
'929' : 34,
'930' : 24,
'931' : 70,
'932' : 13,
'933' : 64,
'934' : 6,
'935' : 19,
'936' : 9,
'937' : 4,
'938' : 24,
'939' : 13,
'940' : 7,
'941' : 34,
'942' : 24,
'943' : 14,
'944' : 5,
'945' : 22,
'946' : 48,
'947' : 13,
'948' : 13,
'949' : 9,
'950' : 106,
'951' : 4,
'952' : 65,
'953' : 32,
'954' : 12,
'955' : 53,
'956' : 70,
'957' : 14,
'958' : 44,
'959' : 101,
'960' : 64,
'961' : 60,
'962' : 5,
'963' : 14,
'964' : 7,
'965' : 48,
'966' : 4,
'967' : 3,
'968' : 100,
'969' : 1,

```
'970': 1,  
'971': 43,  
'972': 9,  
'973': 98,  
'974': 26,  
'975': 33,  
'976': 40,  
'977': 9,  
'978': 19,  
'979': 2,  
'980': 3,  
'981': 61,  
'982': 10,  
'983': 154,  
'984': 7,  
'985': 1,  
'986': 3,  
'987': 74,  
'988': 12,  
'989': 66,  
'990': 4,  
'991': 27,  
'992': 14,  
'993': 30,  
'994': 8,  
'995': 18,  
'996': 8,  
'997': 45,  
'998': 10,  
'999': 22,  
'1000': 7,  
...}
```

Using list comprehension, we can find which player played the most games.

```
In [15]: max_value = max(games_played.values())  
max_key, = [i for i in games_played.keys() if games_played[i] == max_  
value]  
  
print('player {} \n {} games'.format(max_key, max_value))  
  
player 461  
280 games
```

Let's use pandas to find out which players won the most games. First let's convert our graph to a DataFrame.

```
In [16]: df = pd.DataFrame(chess.edges(data=True), columns=['white', 'black',  
              'outcome'])  
df.head()
```

Out[16]:

	white	black	outcome
0	1	2	{'outcome': 0, 'timestamp': 885635999.999997}
1	1	3	{'outcome': 0, 'timestamp': 885635999.999997}
2	1	4	{'outcome': 0, 'timestamp': 885635999.999997}
3	1	5	{'outcome': 1, 'timestamp': 885635999.999997}
4	1	6	{'outcome': 0, 'timestamp': 885635999.999997}

Next we can use a lambda to pull out the outcome from the attributes dictionary.

```
In [17]: df['outcome'] = df['outcome'].map(lambda x: x['outcome'])  
df.head()
```

Out[17]:

	white	black	outcome
0	1	2	0
1	1	3	0
2	1	4	0
3	1	5	1
4	1	6	0

To count the number of times a player won as white, we find the rows where the outcome was '1', group by the white player, and sum.

To count the number of times a player won as back, we find the rows where the outcome was '-1', group by the black player, sum, and multiply by -1.

The we can add these together with a fill value of 0 for those players that only played as either black or white.

```
In [18]: won_as_white = df[df['outcome']==1].groupby('white').sum()
won_as_black = -df[df['outcome']==-1].groupby('black').sum()
win_count = won_as_white.add(won_as_black, fill_value=0)
win_count.head()
```

Out[18]:

	outcome
1	7.0
100	7.0
1000	1.0
1002	1.0
1003	5.0

Using `nlargest` we find that player 330 won the most games at 109.

```
In [19]: win_count.nlargest(5, 'outcome')
```

Out[19]:

	outcome
330	109.0
467	103.0
98	94.0
456	88.0
461	88.0