

# Loading Graphs in NetworkX

October 3, 2019

## 1 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)
```

<IPython.core.display.Javascript object>

<IPython.core.display.HTML object>

### 1.0.1 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 [3]: !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 [4]: G2 = nx.read_adjlist('G_adjlist.txt', nodetype=int)
        G2.edges()
```

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

### 1.0.2 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)]

```

### 1.0.3 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})]
```

#### 1.0.4 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})]
```

### 1.0.5 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