Question 1

In [1]:
```
import numpy as np
import pandas as pd
import plotly.express as px

dx = pd.read_csv('/Users/shilp/Downloads/Project4/Housing_price.csv')
```

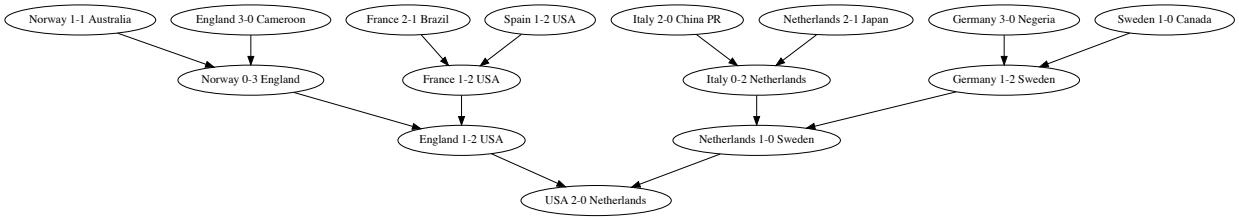
In [2]:
```
fig = px.scatter_mapbox(dx, lat="latitude", lon="longitude",  hover_da
ta=["streetno", "streetname", "price2014"],
                        color_discrete_sequence=["red"], zoom=11.5
                        , height=500)
fig.update_layout(mapbox_style="open-street-map" )
fig.show()
#zoom problem
```

Question 2

In [3]:
```
import graphviz
d = graphviz.Digraph(name='rank_same')

d.attr(rankdir = "TB")

d.node ("USA 2-0 Netherlands")
```

In [4]:
```
sd1 = graphviz.Digraph(name='rank1')
sd1.attr(rank='same')
sd1.node("Norway 1-1 Australia")
sd1.node("England 3-0 Cameroon")
sd1.node("France 2-1 Brazil")
sd1.node("Spain 1-2 USA")
sd2 = graphviz.Digraph(name='rank2')
sd2.attr(rank='same')
sd2.node("Norway 0-3 England")
sd2.node("France 1-2 USA")
sd3 = graphviz.Digraph(name='rank3')
sd3.attr(rank='same')
sd3.node("England 1-2 USA")
d.subgraph(sd1)
d.subgraph(sd2)
d.subgraph(sd3)
sd4 = graphviz.Digraph(name='rank4')
sd4.attr(rank='same')
sd4.node("Netherlands 1-0 Sweden")
sd5 = graphviz.Digraph(name='rank5')
sd5.attr(rank='same')
sd5.node("Italy 0-2 Netherlands")
sd5.node("Germany 1-2 Sweden")
sd6 = graphviz.Digraph(name='rank6')
sd6.attr(rank='same')
sd6.node("Italy 2-0 China PR")
sd6.node("Netherlands 2-1 Japan")
sd6.node("Germany 3-0 Negeria")
sd6.node("Sweden 1-0 Canada")
d.edge("Norway 1-1 Australia" , "Norway 0-3 England")
d.edge("England 3-0 Cameroon" , "Norway 0-3 England")
d.edge("France 2-1 Brazil" , "France 1-2 USA" )
d.edge("Spain 1-2 USA", "France 1-2 USA")
d.edge("Norway 0-3 England" , "England 1-2 USA")
d.edge("France 1-2 USA" , "England 1-2 USA")
d.edge("England 1-2 USA" , "USA 2-0 Netherlands" )
d.edge("Netherlands 1-0 Sweden" , "USA 2-0 Netherlands")
d.edge("Italy 0-2 Netherlands" , "Netherlands 1-0 Sweden")
d.edge("Germany 1-2 Sweden" , "Netherlands 1-0 Sweden")
d.edge("Italy 2-0 China PR" , "Italy 0-2 Netherlands")
d.edge("Netherlands 2-1 Japan" , "Italy 0-2 Netherlands")
d.edge("Germany 3-0 Negeria" , "Germany 1-2 Sweden")
d.edge("Sweden 1-0 Canada" , "Germany 1-2 Sweden")
d
```

Out[4]:



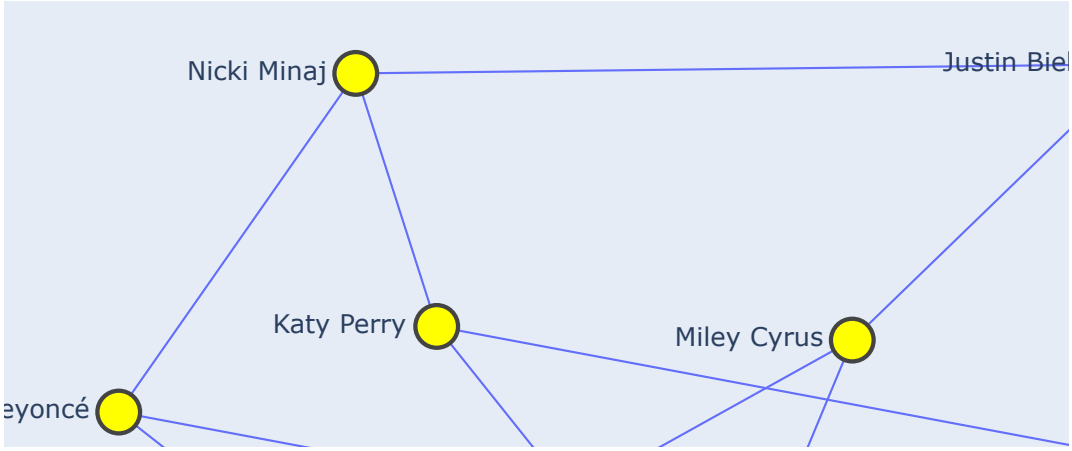
Question 3

In [72]:

```
import plotly.graph_objects as go
import networkx as nx
pos = nx.kamada_kawai_layout(g)

G = nx.Graph ()
g = nx.petersen_graph()

pos = nx.kamada_kawai_layout(g)

artists = {0:"Ariana Grande" , 1:"Selena Gomez", 2:"Beyoncé", 3:"Taylo
r Swift" , 4:"Justin Bieber" ,
           5:"Nicki Minaj", 6:"Jennifer Lopez", 7:"Miley Cyrus" ,
           8:"Katy Perry", 9:"Demi Lovato"}

G1 = nx.Graph()

e1 = [(0,4),(4,0), (0,2), (0,3), (0,4) , (0,6) , (0,8), (1,2) , (1,3)
,
      (1,4) , (1,5) , (1,6), (1,8) , (1,9) , (2,3) , (2,4) , (2,9) ,(3
,4),
       (5,2) , (8,9)]

e1 = g.edges()
G1.add_edges_from(e1)
G1.edges()

H = nx.relabel_nodes(G1,artists)

edge_x = []
edge_y = []
for edge in g.edges():
    x0 = pos[edge[0]][0]
    y0 = pos[edge[0]][1]
    x1 = pos[edge[1]][0]
    y1 = pos[edge[1]][1]
    edge_x.append(x0)
    edge_x.append(x1)
    edge_x.append(None)
```

```
    edge_y.append(y0)
    edge_y.append(y1)
    edge_y.append(None)

edge_trace = go.Scatter(
    x=edge_x,
    y=edge_y,
    mode='lines',
    line = dict(width = 1))

node_x = []
node_y = []
for node in g.nodes():

    x = pos[node][0]
    y = pos[node][1]
    node_x.append(x)
    node_y.append(y)

node_trace = go.Scatter(
    x=node_x,
    y=node_y,
    mode="markers + text",
    text = list(H.nodes),
    textposition = "middle left",
    hoverinfo = "text",
    marker=dict(
        size=20,
        color= "Yellow",
        line_width=2))

fig = go.Figure(data=[edge_trace, node_trace],
             layout=go.Layout(
                title="Collaborations between Artists",
                titlefont_size=20,
                showlegend=False,
                xaxis=dict(showgrid=False, zeroline=False, showticklab
els=False),
                yaxis=dict(showgrid=False, zeroline=False, showticklab
els=False)),

                )
fig.show()
```

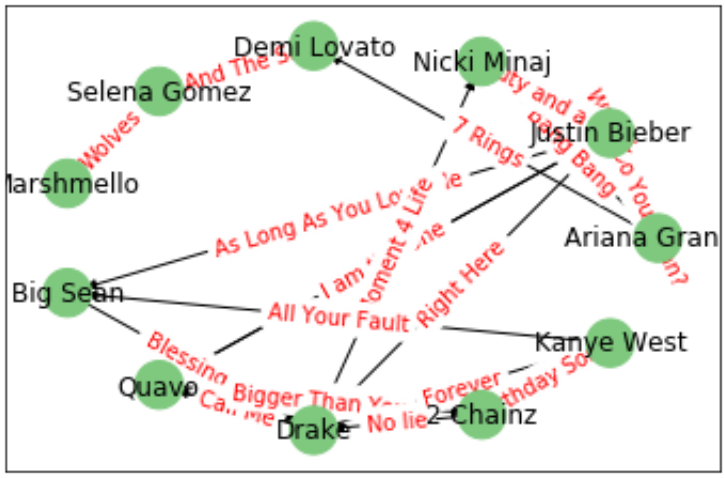
Collaborations between Artists



In [95]:
```
import networkx as nx
import matplotlib.pyplot as plt

G = nx.DiGraph()
G.add_edges_from(
#artists = {0:"Ariana Grande" , 1:"Selena Gomez", 2:"Beyoncé", 3:"Taylor Swift" , 4:"Justin Bieber" ,
#           5:"Nicki Minaj", 6:"Jennifer Lopez", 7:"Miley Cyrus" ,
#           8:"Katy Perry", 9:"Demi Lovato"}
    [('Ariana Grande', 'Justin Bieber'), ('Ariana Grande', 'Nicki Minaj'), ('Ariana Grande', 'Demi Lovato'),

     ('Selena Gomez', 'Demi Lovato'),('Selena Gomez', 'Marshmello'),

     ('Marshmello', 'Selena Gomez'),

     ('Nicki Minaj', 'Justin Bieber'),
```

```
     ('Justin Bieber', 'Big Sean'), ('Justin Bieber', 'Quavo'),

     ('Big Sean', 'Drake'), ('Drake', 'Quavo'),

     ('Quavo', '2 Chainz'), ('Quavo', 'Justin Bieber'),

     ('2 Chainz', 'Drake'), ('2 Chainz', 'Kanye West'),

     ('Drake', 'Justin Bieber'), ('Drake', 'Kanye West'), ('Drake', 'N
icki Minaj'),

     ('Kanye West', '2 Chainz'), ('Kanye West', 'Big Sean')])

val_map = {'A': 10,
           'D': 55,
           'H': 100}

values = [val_map.get(node, 5.0) for node in G.nodes()]

# Specify the edges you want here

edge_colours = ['black' if not edge in red_edges else 'yellow'
                for edge in G.edges()]
black_edges = [edge for edge in G.edges() if edge not in red_edges]

# Need to create a layout when doing
# separate calls to draw nodes and edges
pos = nx.circular_layout(G)
nx.draw_networkx_nodes(G, pos, cmap=plt.get_cmap('Accent'),
                       node_color = values, node_size = 500)
nx.draw_networkx_labels(G, pos)
nx.draw_networkx_edges(G, pos, edgelist=black_edges, edge_color='white
', arrows=True)
nx.draw_networkx_edges(G, pos, edgelist=black_edges, arrows=True)
nx.draw_networkx_edge_labels(G,pos,edge_labels={
    ('Ariana Grande', 'Justin Bieber'):'What Do You Mean?',
    ('Ariana Grande', 'Nicki Minaj'):'Bang Bang',
    ('Ariana Grande', 'Demi Lovato'):'7 Rings',

     ('Selena Gomez', 'Demi Lovato'):'One And The Same',
     ('Selena Gomez', 'Marshmello'):'Wolves',


     ('Nicki Minaj', 'Justin Bieber'):'Beauty and a Beat',

     ('Justin Bieber', 'Big Sean'):'As Long As You Love Me',
     ('Justin Bieber', 'Quavo'):'Intentions',

     ('Big Sean', 'Drake'):'Blessings',
```

```
    ('Drake', 'Quavo'):'Call Me',

     ('Quavo', '2 Chainz'):'Bigger Than You',
    ('Quavo', 'Justin Bieber'):'I am the One',

     ('2 Chainz', 'Drake'):'No lie', ('2 Chainz', 'Kanye West'):'Mercy
',

     ('Drake', 'Justin Bieber'):'Right Here',
    ('Drake', 'Kanye West'):'Forever',
    ('Drake', 'Nicki Minaj'):'Moment 4 Life',

     ('Kanye West', '2 Chainz'):'Birthday Song', ('Kanye West', 'Big S
ean'):'All Your Fault'



},font_color='red')
plt.show()
```

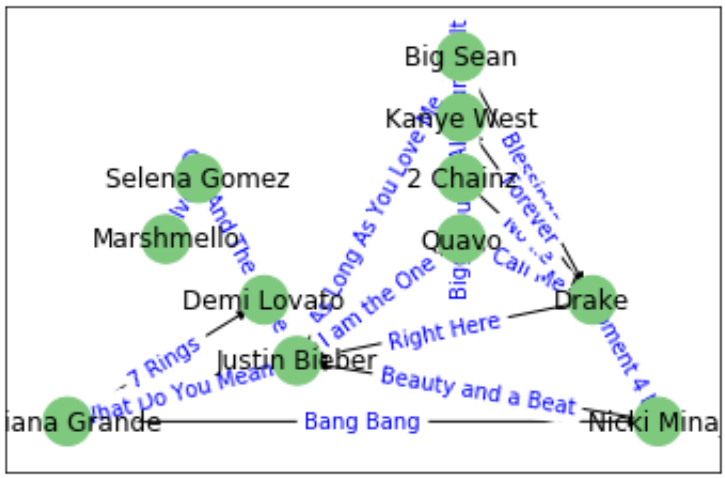


In [101]:
```
import networkx as nx
import matplotlib.pyplot as plt

G = nx.DiGraph()
G.add_edges_from(

    [('Ariana Grande', 'Justin Bieber'), ('Ariana Grande', 'Nicki Mina
j'), ('Ariana Grande', 'Demi Lovato'),

     ('Selena Gomez', 'Demi Lovato'),('Selena Gomez', 'Marshmello'),

     ('Marshmello', 'Selena Gomez'),

     ('Nicki Minaj', 'Justin Bieber'),
```

```
     ('Justin Bieber', 'Big Sean'), ('Justin Bieber', 'Quavo'),

     ('Big Sean', 'Drake'), ('Drake', 'Quavo'),

     ('Quavo', '2 Chainz'), ('Quavo', 'Justin Bieber'),

     ('2 Chainz', 'Drake'), ('2 Chainz', 'Kanye West'),

     ('Drake', 'Justin Bieber'), ('Drake', 'Kanye West'), ('Drake', 'N
icki Minaj'),

     ('Kanye West', '2 Chainz'), ('Kanye West', 'Big Sean')])

val_map = {'A': 200,
           'D': 200,
           'H': 200}

values = [val_map.get(node, 20.0) for node in G.nodes()]


edge_colours = ['black' if not edge in red_edges else 'yellow'
                for edge in G.edges()]
black_edges = [edge for edge in G.edges() if edge not in red_edges]

pos = nx.planar_layout(G)

nx.draw_networkx_nodes(G, pos, cmap=plt.get_cmap('Accent'),
                       node_color = values, node_size = 500)
nx.draw_networkx_labels(G, pos)
nx.draw_networkx_edges(G, pos, edgelist=black_edges, edge_color='white
', arrows=True)
nx.draw_networkx_edges(G, pos, edgelist=black_edges, arrows=True)
nx.draw_networkx_edge_labels(G,pos,edge_labels={
    ('Ariana Grande', 'Justin Bieber'):'What Do You Mean?',
    ('Ariana Grande', 'Nicki Minaj'):'Bang Bang',
    ('Ariana Grande', 'Demi Lovato'):'7 Rings',

     ('Selena Gomez', 'Demi Lovato'):'One And The Same',
     ('Selena Gomez', 'Marshmello'):'Wolves',


     ('Nicki Minaj', 'Justin Bieber'):'Beauty and a Beat',

     ('Justin Bieber', 'Big Sean'):'As Long As You Love Me',
     ('Justin Bieber', 'Quavo'):'Intentions',

     ('Big Sean', 'Drake'):'Blessings',
    ('Drake', 'Quavo'):'Call Me',

     ('Quavo', '2 Chainz'):'Bigger Than You',
```

```
    ('Quavo', 'Justin Bieber'):'I am the One',

     ('2 Chainz', 'Drake'):'No lie', ('2 Chainz', 'Kanye West'):'Mercy
',

     ('Drake', 'Justin Bieber'):'Right Here',
    ('Drake', 'Kanye West'):'Forever',
    ('Drake', 'Nicki Minaj'):'Moment 4 Life',

     ('Kanye West', '2 Chainz'):'Birthday Song', ('Kanye West', 'Big S
ean'):'All Your Fault'



},font_color='blue')
plt.show()
```

```
/opt/anaconda3/lib/python3.7/site-packages/networkx/drawing/layout.p
y:923: FutureWarning:

arrays to stack must be passed as a "sequence" type such as list or
tuple. Support for non-sequence iterables such as generators is depr
ecated as of NumPy 1.16 and will raise an error in the future.
```



In [ ]: