```
In [1]: from IPython.display import Image
        Image(filename='1_0A8eTfcCEI4vQdErHdrwEQ.jpg', width="800", height='50')
```

```
Out[1]:
```

Problem Statement

With FIFA is in the blood of many people of the world. You are tasked to tell the story of unsung analysts who put great efforts to provide accurate data to answer every question of fans. The

FIFA World Cup is a global football competition contested by the various football-playing nations of the world. It is contested every four years and is the most prestigious and important trophy in the sport of football.

The World Cups dataset shows all information about all the World Cups in history, while the World Cup Matches dataset shows all the results from the matches contested as part of the cups.

Find key metrics and factors that influence the World Cup win. Do your own research and come up with your findings.

Importing Libraries

In [2]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
import plotly as py
import cufflinks as cf
import warnings
warnings.filterwarnings(action = 'ignore')
```

In [3]:
```
players = pd.read_csv("WorldCupPlayers.csv")
matches = pd.read_csv("WorldCupMatches.csv")
world_cup = pd.read_csv("WorldCups.csv")
```

In [4]:
```
players.head()
```

Out[4]:

	RoundID	MatchID	Team Initials	Coach Name	Line-up	Shirt Number	Player Name	Position	Event
0	201	1096	FRA	CAUDRON Raoul (FRA)	S	0	Alex THEPOT	GK	NaN
1	201	1096	MEX	LUQUE Juan (MEX)	S	0	Oscar BONFIGLIO	GK	NaN
2	201	1096	FRA	CAUDRON Raoul (FRA)	S	0	Marcel LANGILLER	NaN	G40'
3	201	1096	MEX	LUQUE Juan (MEX)	S	0	Juan CARRENO	NaN	G70'
4	201	1096	FRA	CAUDRON Raoul (FRA)	S	0	Ernest LIBERATI	NaN	NaN

In [5]:
```
players.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 37784 entries, 0 to 37783
Data columns (total 9 columns):
 #   Column         Non-Null Count  Dtype 
---  ------         --------------  ----- 
 0   RoundID        37784 non-null  int64 
 1   MatchID        37784 non-null  int64 
 2   Team Initials  37784 non-null  object
 3   Coach Name     37784 non-null  object
 4   Line-up        37784 non-null  object
 5   Shirt Number   37784 non-null  int64 
 6   Player Name    37784 non-null  object
 7   Position       4143 non-null   object
 8   Event          9069 non-null   object
dtypes: int64(3), object(6)
memory usage: 2.6+ MB
```

In [6]:
```
players.shape
```

Out[6]:
```
(37784, 9)
```

In [7]:
```
matches.head()
```

Out[7]:

	Year	Datetime	Stage	Stadium	City	Home Team Name	Home Team Goals	Away Team Goals	Away Team Name	W conditio
0	1930.0	13 Jul 1930 - 15:00	Group 1	Pocitos	Montevideo	France	4.0	1.0	Mexico	
1	1930.0	13 Jul 1930 - 15:00	Group 4	Parque Central	Montevideo	USA	3.0	0.0	Belgium	
2	1930.0	14 Jul 1930 - 12:45	Group 2	Parque Central	Montevideo	Yugoslavia	2.0	1.0	Brazil	
3	1930.0	14 Jul 1930 - 14:50	Group 3	Pocitos	Montevideo	Romania	3.0	1.0	Peru	
4	1930.0	15 Jul 1930 - 16:00	Group 1	Parque Central	Montevideo	Argentina	1.0	0.0	France	

In [8]:
```
matches.tail()
```

Out[8]:

	Year	Datetime	Stage	Stadium	City	Home Team Name	Home Team Goals	Away Team Goals	Away Team Name	Win conditions	Attenda
4567	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4568	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4569	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4570	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	
4571	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	

In [9]:
```
matches.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 4572 entries, 0 to 4571
Data columns (total 20 columns):
 #   Column                Non-Null Count  Dtype  
---  ------                --------------  -----  
 0   Year                  852 non-null    float64
 1   Datetime              852 non-null    object 
 2   Stage                 852 non-null    object 
 3   Stadium               852 non-null    object 
 4   City                  852 non-null    object 
 5   Home Team Name        852 non-null    object 
 6   Home Team Goals       852 non-null    float64
 7   Away Team Goals       852 non-null    float64
 8   Away Team Name        852 non-null    object 
 9   Win conditions        852 non-null    object 
 10  Attendance            850 non-null    float64
 11  Half-time Home Goals  852 non-null    float64
 12  Half-time Away Goals  852 non-null    float64
 13  Referee               852 non-null    object 
 14  Assistant 1           852 non-null    object 
 15  Assistant 2           852 non-null    object 
 16  RoundID               852 non-null    float64
 17  MatchID               852 non-null    float64
 18  Home Team Initials    852 non-null    object 
 19  Away Team Initials    852 non-null    object 
dtypes: float64(8), object(12)
memory usage: 714.5+ KB
```

In [10]:
```
matches.shape
```

Out[10]:
```
(4572, 20)
```

In [11]:
```
world_cup.head()
```

Out[11]:

	Year	Country	Winner	Runners-Up	Third	Fourth	GoalsScored	QualifiedTea
0	1930	Uruguay	Uruguay	Argentina	USA	Yugoslavia	70	
1	1934	Italy	Italy	Czechoslovakia	Germany	Austria	70	
2	1938	France	Italy	Hungary	Brazil	Sweden	84	
3	1950	Brazil	Uruguay	Brazil	Sweden	Spain	88	
4	1954	Switzerland	Germany FR	Hungary	Austria	Uruguay	140	

In [12]:
```
world_cup.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 20 entries, 0 to 19
Data columns (total 10 columns):
 #   Column          Non-Null Count  Dtype 
---  ------          --------------  ----- 
 0   Year            20 non-null     int64 
 1   Country         20 non-null     object
 2   Winner          20 non-null     object
 3   Runners-Up      20 non-null     object
 4   Third           20 non-null     object
 5   Fourth          20 non-null     object
 6   GoalsScored     20 non-null     int64 
 7   QualifiedTeams  20 non-null     int64 
 8   MatchesPlayed   20 non-null     int64 
 9   Attendance      20 non-null     object
dtypes: int64(4), object(6)
memory usage: 1.7+ KB
```

In [13]:
```
world_cup.shape
```

Out[13]:
```
(20, 10)
```

Data Cleaning

In [14]:
```
# Drop the empty rows from the matches data
matches.dropna(subset = ['Year'], inplace = True)
```

In [15]:
```
matches.tail()
```

Out[15]:

	Year	Datetime	Stage	Stadium	City	Home Team Name	Home Team Goals	Away Team Goals	Away Team Name
847	2014.0	05 Jul 2014 - 17:00	Quarter-finals	Arena Fonte Nova	Salvador	Netherlands	0.0	0.0	Costa Rica
848	2014.0	08 Jul 2014 - 17:00	Semi-finals	Estadio Mineirao	Belo Horizonte	Brazil	1.0	7.0	Germany
849	2014.0	09 Jul 2014 - 17:00	Semi-finals	Arena de Sao Paulo	Sao Paulo	Netherlands	0.0	0.0	Argentina
850	2014.0	12 Jul 2014 - 17:00	Play-off for third place	Estadio Nacional	Brasilia	Brazil	0.0	3.0	Netherlands
851	2014.0	13 Jul 2014 - 16:00	Final	Estadio do Maracana	Rio De Janeiro	Germany	1.0	0.0	Argentina

In [16]:
```
# Counting the countries that played their Home games
matches['Home Team Name'].value_counts()
```

Out[16]:
```
Home Team Name
Brazil                         82
Italy                          57
Argentina                      54
Germany FR                     43
England                        35
                               ..
Wales                           1
Norway                          1
rn">United Arab Emirates        1
Haiti                           1
rn">Bosnia and Herzegovina      1
Name: count, Length: 78, dtype: int64
```

In [17]:
```
names = matches[matches['Home Team Name'].str.contains('rn">')]['Home Team N
names
```

Out[17]:
```
Home Team Name
rn">Republic of Ireland       5
rn">United Arab Emirates      1
rn">Trinidad and Tobago       1
rn">Serbia and Montenegro     1
rn">Bosnia and Herzegovina    1
Name: count, dtype: int64
```

In [18]:
```
wrong = list(names.index)
wrong
```

Out[18]:
```
['rn">Republic of Ireland',
 'rn">United Arab Emirates',
 'rn">Trinidad and Tobago',
 'rn">Serbia and Montenegro',
 'rn">Bosnia and Herzegovina']
```

In [19]:
```
correct = [name.split('>')[1] for name in wrong]
correct
```

Out[19]:
```
['Republic of Ireland',
 'United Arab Emirates',
 'Trinidad and Tobago',
 'Serbia and Montenegro',
 'Bosnia and Herzegovina']
```

In [20]:
```
old_name = ['Germany FR', 'Maracan� - Est�dio Jornalista M�rio Filho', 'E
new_name = ['Germany', 'Maracan Stadium', 'Maracan Stadium']
```

In [21]:
```
wrong = wrong + old_name
correct = correct + new_name
```

In [22]:
```
wrong, correct
```

Out[22]:
```
(['rn">Republic of Ireland',
  'rn">United Arab Emirates',
  'rn">Trinidad and Tobago',
  'rn">Serbia and Montenegro',
  'rn">Bosnia and Herzegovina',
  'Germany FR',
  'Maracan� - Est�dio Jornalista M�rio Filho',
  'Estadio do Maracana'],
 ['Republic of Ireland',
  'United Arab Emirates',
  'Trinidad and Tobago',
  'Serbia and Montenegro',
  'Bosnia and Herzegovina',
  'Germany',
  'Maracan Stadium',
  'Maracan Stadium'])
```

In [23]:
```
for index, wr in enumerate(wrong):
    world_cup = world_cup.replace(wrong[index], correct[index])

for index, wr in enumerate(wrong):
    matches = matches.replace(wrong[index], correct[index])

for index, wr in enumerate(wrong):
    players = players.replace(wrong[index], correct[index])
```

In [24]:
```
names = matches[matches['Home Team Name'].str.contains('rn">')]['Home Team N
names
```

Out[24]:
```
Series([], Name: count, dtype: int64)
```

Most Number of World Cup Winning Title

In [25]:
```
winner = world_cup['Winner'].value_counts()
winner
```

Out[25]:
```
Winner
Brazil       5
Italy        4
Germany      4
Uruguay      2
Argentina    2
England      1
France       1
Spain        1
Name: count, dtype: int64
```

In [26]:
```
# Most number of Worls Cup Runner-Up
runnerup = world_cup['Runners-Up'].value_counts()
runnerup
```

Out[26]:
```
Runners-Up
Germany           4
Argentina         3
Netherlands       3
Czechoslovakia    2
Hungary           2
Brazil            2
Italy             2
Sweden            1
France            1
Name: count, dtype: int64
```

In [27]:
```
# Most Number of World cup Third Place Team
third = world_cup['Third'].value_counts()
third
```

Out[27]:
```
Third
Germany        4
Brazil         2
Sweden         2
France         2
Poland         2
USA            1
Austria        1
Chile          1
Portugal       1
Italy          1
Croatia        1
Turkey         1
Netherlands    1
Name: count, dtype: int64
```

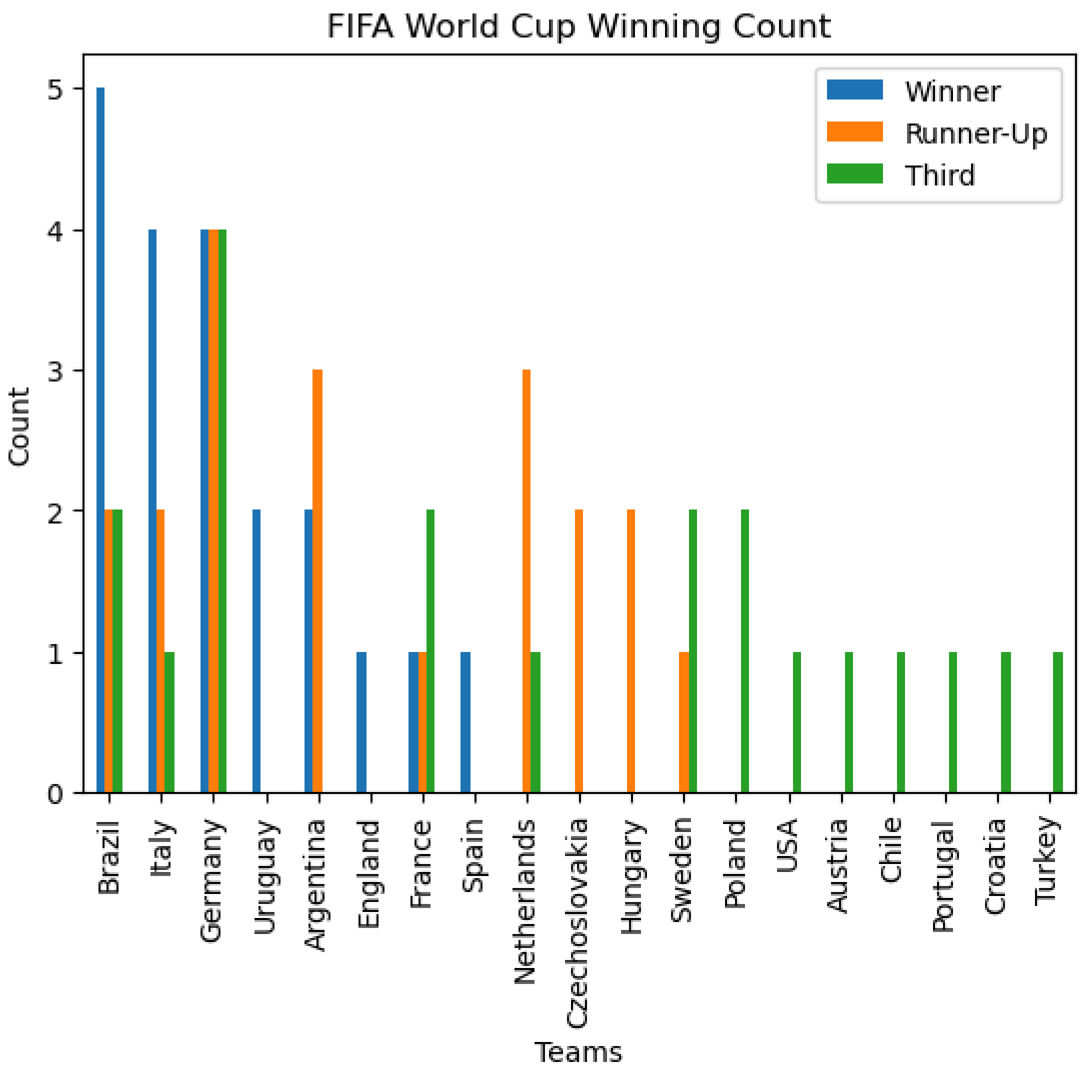
In [28]:
```
teams = pd.concat([winner, runnerup, third], axis=1)
teams.fillna(0, inplace=True)
teams = teams.astype(int)
teams.columns = ['Winner', 'Runner-Up', 'Third']
teams
```

Out[28]:

	Winner	Runner-Up	Third
Brazil	5	2	2
Italy	4	2	1
Germany	4	4	4
Uruguay	2	0	0
Argentina	2	3	0
England	1	0	0
France	1	1	2
Spain	1	0	0
Netherlands	0	3	1
Czechoslovakia	0	2	0
Hungary	0	2	0
Sweden	0	1	2
Poland	0	0	2
USA	0	0	1
Austria	0	0	1
Chile	0	0	1
Portugal	0	0	1
Croatia	0	0	1
Turkey	0	0	1

In [29]:
```
plt.figure(figsize = (14,8))
teams.plot(kind = 'bar')
plt.xlabel('Teams')
plt.ylabel('Count')
plt.title("FIFA World Cup Winning Count")
plt.show()
```

```
<Figure size 1400x800 with 0 Axes>
```



Number of Goals Per Country

In [30]:
```
home = matches[['Home Team Name', 'Home Team Goals']].dropna()
away = matches[['Away Team Name', 'Away Team Goals']].dropna()
```

In [31]:
```
home.columns = ['Countries', 'Goals']
away.columns = home.columns
```

In [32]:
```
goals = pd.concat([home, away], ignore_index = True)
goals = goals.groupby('Countries').sum()
goals
```

Out[32]:

	Goals
Countries	
Algeria	14.0
Angola	1.0
Argentina	133.0
Australia	11.0
Austria	43.0
...	...
United Arab Emirates	2.0
Uruguay	80.0
Wales	4.0
Yugoslavia	60.0
Zaire	0.0

82 rows × 1 columns

In [33]:
```
goals = goals.sort_values(by = 'Goals', ascending = False)
goals
```

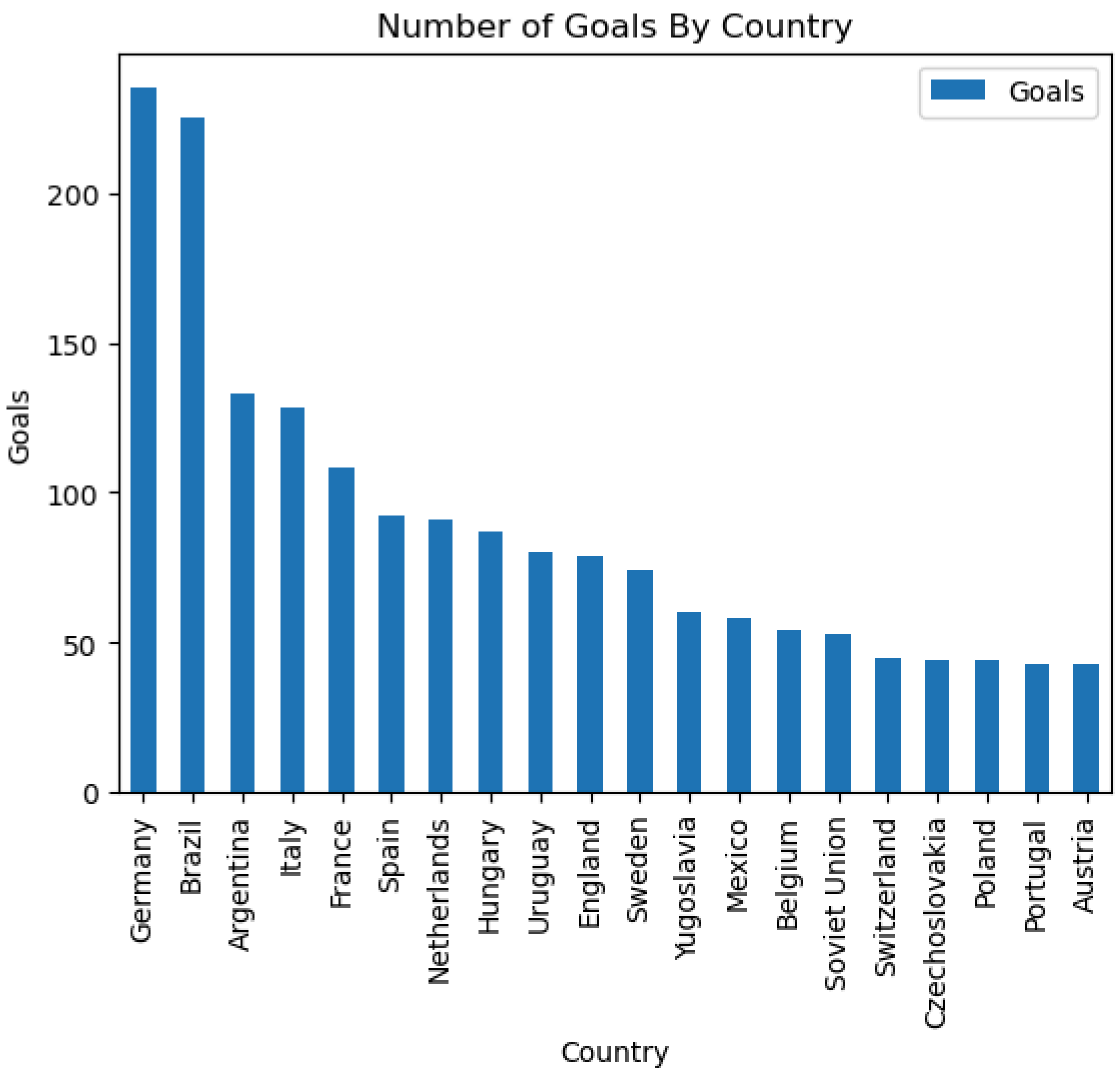
Out[33]:

	Goals
Countries	
Germany	235.0
Brazil	225.0
Argentina	133.0
Italy	128.0
France	108.0
...	...
Trinidad and Tobago	0.0
Canada	0.0
China PR	0.0
Dutch East Indies	0.0
Zaire	0.0

82 rows × 1 columns

In [34]:
```
plt.figure(figsize = (14,8))
goals[:20].plot(kind = 'bar')
plt.xlabel("Country")
plt.ylabel("Goals")
plt.title("Number of Goals By Country")
plt.show()
```

```
<Figure size 1400x800 with 0 Axes>
```



Number of Teams, Goals and Matches per Cup

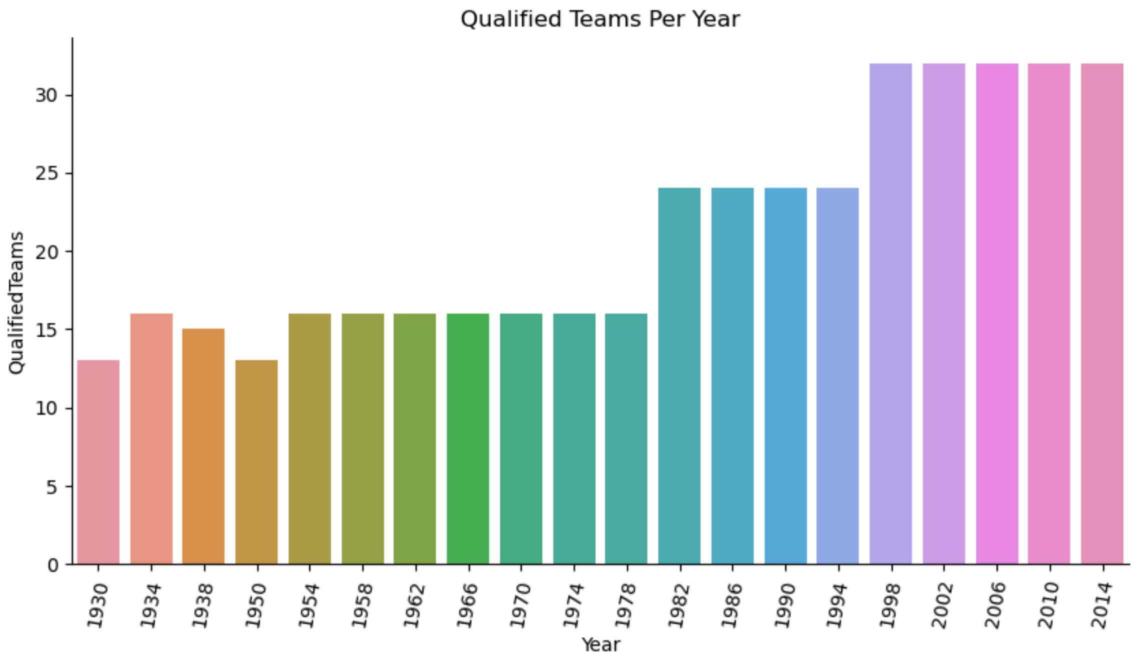
In [35]:
```
world_cup['Attendance'] = world_cup['Attendance'].str.replace(".", "")
world_cup.head()
```

Out[35]:

	Year	Country	Winner	Runners-Up	Third	Fourth	GoalsScored	QualifiedTea
0	1930	Uruguay	Uruguay	Argentina	USA	Yugoslavia	70	
1	1934	Italy	Italy	Czechoslovakia	Germany	Austria	70	
2	1938	France	Italy	Hungary	Brazil	Sweden	84	
3	1950	Brazil	Uruguay	Brazil	Sweden	Spain	88	
4	1954	Switzerland	Germany	Hungary	Austria	Uruguay	140	

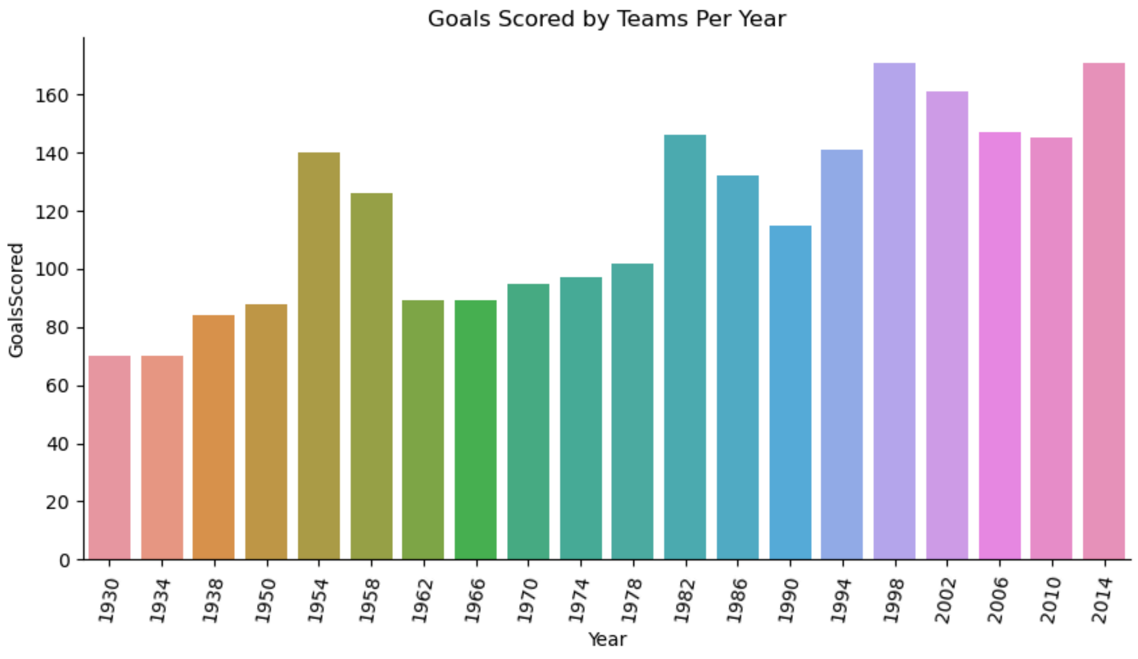
In [36]:
```
fig, ax = plt.subplots(figsize = (10,5))
sns.despine(right = True)
g = sns.barplot(x = 'Year', y = 'QualifiedTeams', data = world_cup)
g.set_xticklabels(g.get_xticklabels(), rotation = 80)
g.set_title('Qualified Teams Per Year')
```

Out[36]:
```
Text(0.5, 1.0, 'Qualified Teams Per Year')
```



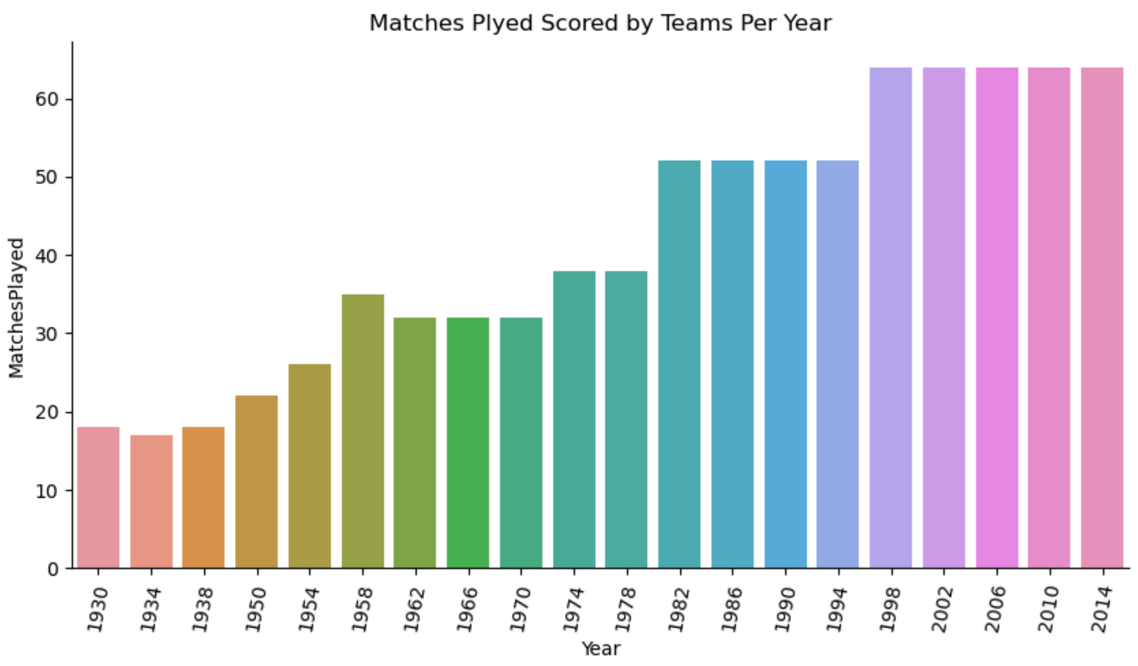
In [37]:
```
fig, ax = plt.subplots(figsize = (10,5))
sns.despine(right = True)
g = sns.barplot(x = 'Year', y = 'GoalsScored', data = world_cup)
g.set_xticklabels(g.get_xticklabels(), rotation = 80)
g.set_title('Goals Scored by Teams Per Year')
```

Out[37]:
```
Text(0.5, 1.0, 'Goals Scored by Teams Per Year')
```



In [38]:
```
fig, ax = plt.subplots(figsize = (10,5))
sns.despine(right = True)
g = sns.barplot(x = 'Year', y = 'MatchesPlayed', data = world_cup)
g.set_xticklabels(g.get_xticklabels(), rotation = 80)
g.set_title('Matches Plyed Scored by Teams Per Year')
```

Out[38]:
```
Text(0.5, 1.0, 'Matches Plyed Scored by Teams Per Year')
```



Goals Per Team Per World Cup

In [39]:
```
home = matches.groupby(['Year', 'Home Team Name'])['Home Team Goals'].sum()
home
```

Out[39]:
```
Year    Home Team Name
1930.0  Argentina         16.0
        Brazil             4.0
        Chile              4.0
        France             4.0
        Paraguay           1.0
                          ...
2014.0  Russia             1.0
        Spain              1.0
        Switzerland        4.0
        USA                2.0
        Uruguay            3.0
Name: Home Team Goals, Length: 366, dtype: float64
```

In [40]:
```
away = matches.groupby(['Year', 'Away Team Name'])['Away Team Goals'].sum()
away
```

Out[40]:
```
Year    Away Team Name
1930.0  Argentina         2.0
        Belgium           0.0
        Bolivia           0.0
        Brazil            1.0
        Chile             1.0
                         ...
2014.0  Russia            1.0
        Spain             3.0
        Switzerland       3.0
        USA               4.0
        Uruguay           1.0
Name: Away Team Goals, Length: 411, dtype: float64
```

In [41]:
```
goals = pd.concat([home, away], axis=1)
goals.fillna(0, inplace=True)
goals['Goals'] = goals['Home Team Goals'] + goals['Away Team Goals']
goals = goals.drop(labels = ['Home Team Goals', 'Away Team Goals'], axis = 
goals
```

Out[41]:

		Goals
Year		
1930.0	**Argentina**	18.0
	Brazil	5.0
	Chile	5.0
	France	4.0
	Paraguay	1.0
...	**...**	...
1998.0	**Iran**	2.0
	Mexico	8.0
	Norway	5.0
	Tunisia	1.0
2006.0	**IR Iran**	0.0

427 rows × 1 columns

In [42]:
```
goals = goals.reset_index()
```

In [43]:
```
goals.columns = ['Year', 'Country', 'Goals']
goals = goals.sort_values(by = ['Year', 'Goals'], ascending = [True, False]
goals
```

Out[43]:

	Year	Country	Goals
0	1930.0	Argentina	18.0
7	1930.0	Uruguay	15.0
6	1930.0	USA	7.0
8	1930.0	Yugoslavia	7.0
1	1930.0	Brazil	5.0
...	...	...	...
355	2014.0	Japan	2.0
361	2014.0	Russia	2.0
340	2014.0	Cameroon	1.0
352	2014.0	Honduras	1.0
353	2014.0	IR Iran	1.0

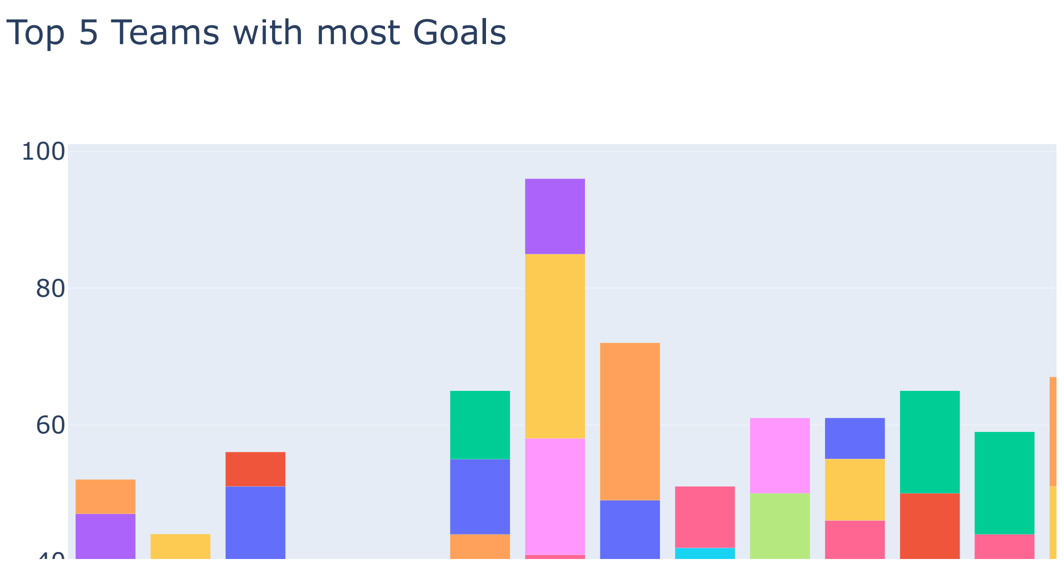
427 rows × 3 columns

In [44]:
```
top5 = goals.groupby('Year').head()
top5.head(10)
```

Out[44]:

	Year	Country	Goals
0	1930.0	Argentina	18.0
7	1930.0	Uruguay	15.0
6	1930.0	USA	7.0
8	1930.0	Yugoslavia	7.0
1	1930.0	Brazil	5.0
13	1934.0	Italy	12.0
11	1934.0	Germany	11.0
10	1934.0	Czechoslovakia	9.0
9	1934.0	Austria	7.0
12	1934.0	Hungary	5.0

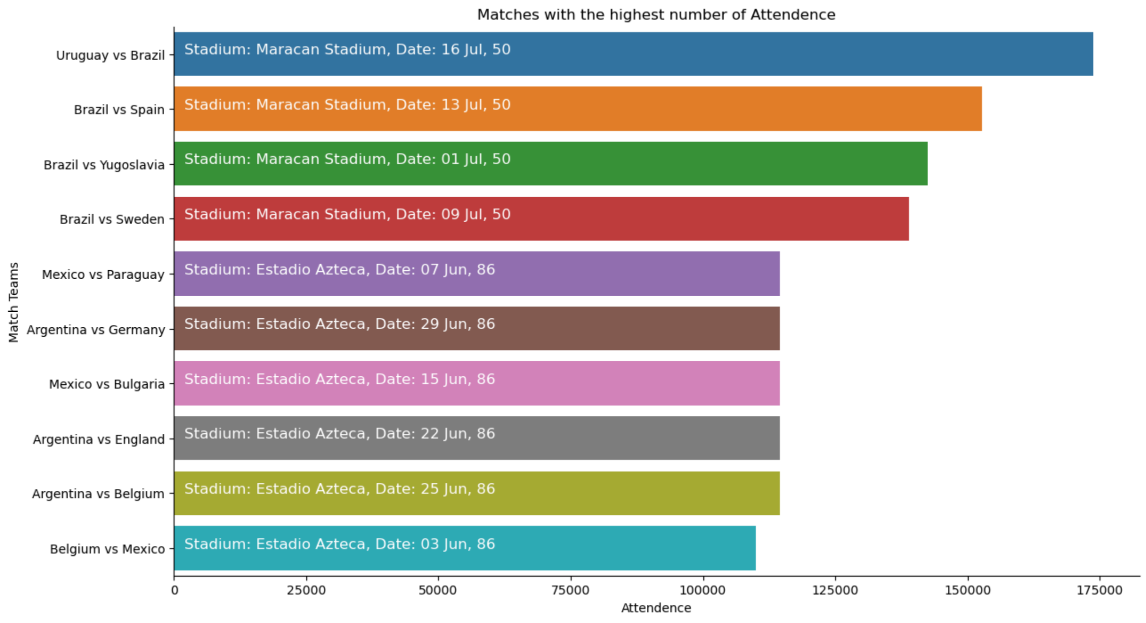
In [45]:
```
import plotly.graph_objects as go

x, y = goals['Year'].values, goals['Goals'].values

data = []
for team in top5['Country'].drop_duplicates().values:
    year = top5[top5['Country'] == team]['Year']
    goal = top5[top5['Country'] == team]['Goals']

    data.append(go.Bar(x = year, y = goal, name = team))
layout = go.Layout(barmode = 'stack', title = 'Top 5 Teams with most Goals'
fig = go.Figure(data = data, layout = layout)
fig.show()
```



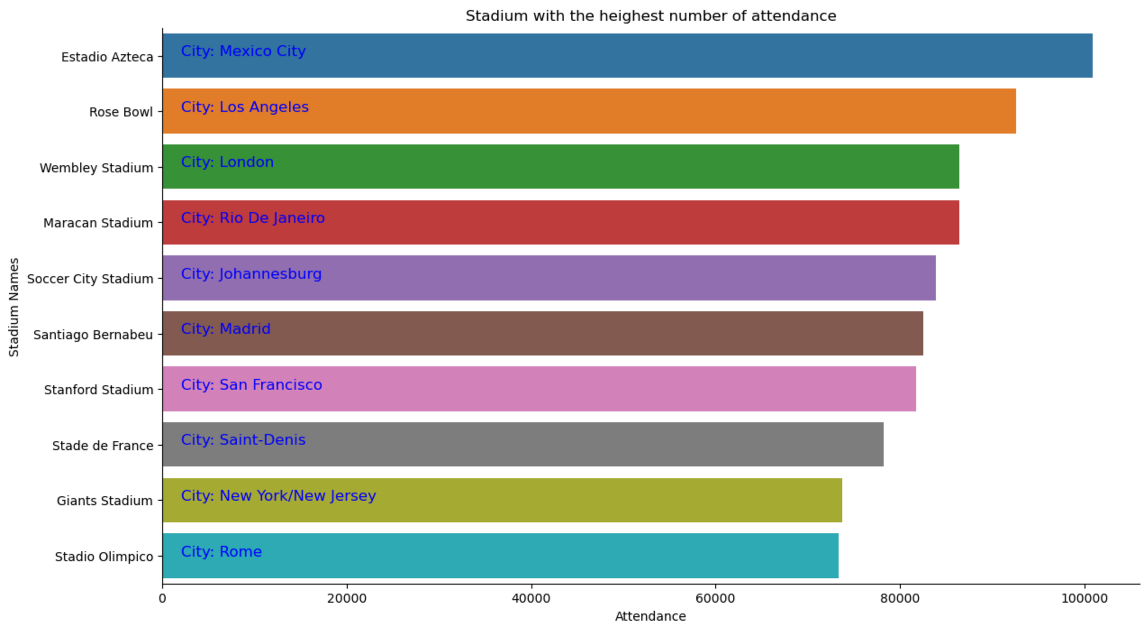
Matches With Highest Number of Attendance

In [46]:
```
matches['Datetime'] = pd.to_datetime(matches['Datetime'], errors='coerce')

matches['Datetime'] = matches['Datetime'].apply(lambda x: x.strftime('%d %b
```

In [47]:
```
top10 = matches.sort_values(by = 'Attendance', ascending = False)[:10]
top10['vs'] = top10['Home Team Name'] + " vs " + top10['Away Team Name']

plt.figure(figsize = (14,8))

ax = sns.barplot(y = top10['vs'], x = top10['Attendance'])
sns.despine(right = True)

plt.ylabel('Match Teams')
plt.xlabel('Attendence')
plt.title('Matches with the highest number of Attendence')

for i, s in enumerate("Stadium: " + top10['Stadium'] +", Date: " + top10['Da
    ax.text(2000, i, s, fontsize = 12, color = 'white')
plt.show()
```

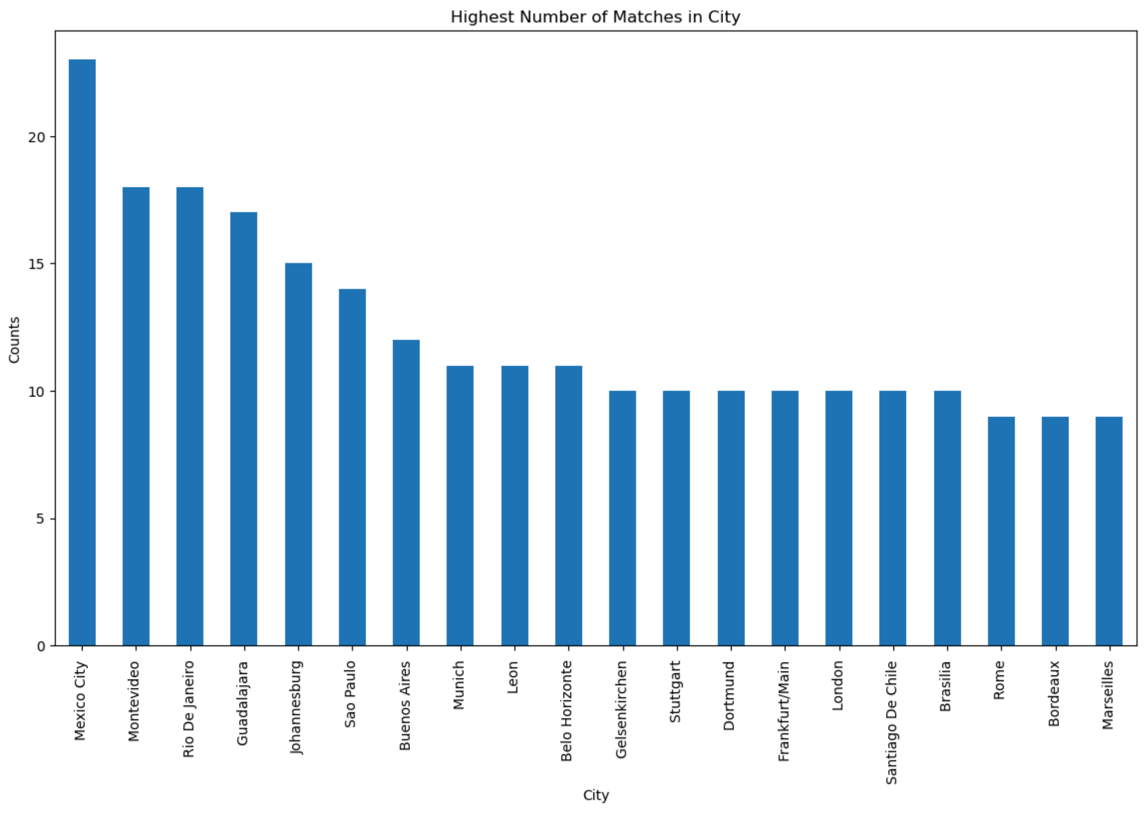


In [48]:
```
# Stadium with Highest Average Attendance
matches['Year'] = matches['Year'].astype(int)

std = matches.groupby(['Stadium', 'City'])['Attendance'].mean().reset_index(

top10 = std[:10]

plt.figure(figsize = (14,8))
ax = sns.barplot(y = top10['Stadium'], x = top10['Attendance'])
sns.despine(right = True)

plt.ylabel('Stadium Names')
plt.xlabel('Attendance')
plt.title('Stadium with the heighest number of attendance')
for i, s in enumerate("City: " + top10['City']):
        ax.text(2000, i, s, fontsize = 12, color = 'b')

plt.show()
```



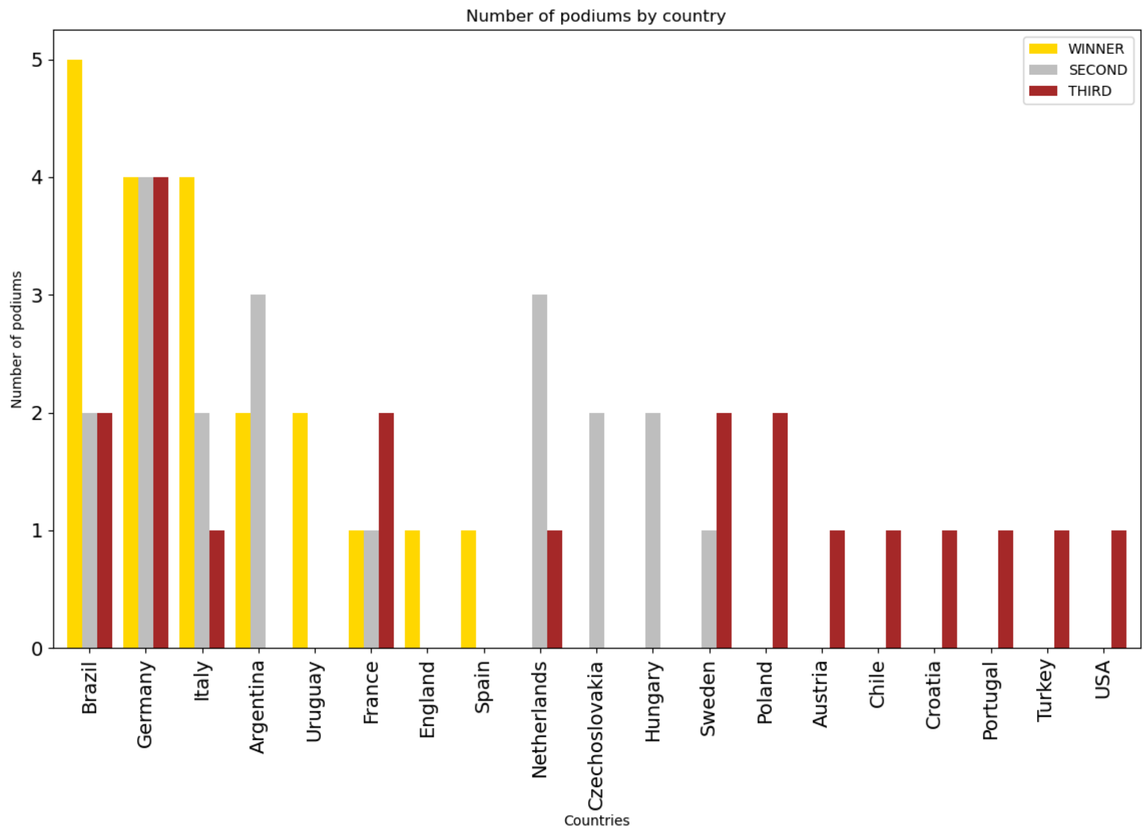
In [49]:
```
plt.figure(figsize= (14,8))
matches['City'].value_counts()[:20].plot(kind = 'bar')
plt.xlabel("City")
plt.ylabel("Counts")
plt.title("Highest Number of Matches in City")
```

Out[49]:
```
Text(0.5, 1.0, 'Highest Number of Matches in City')
```

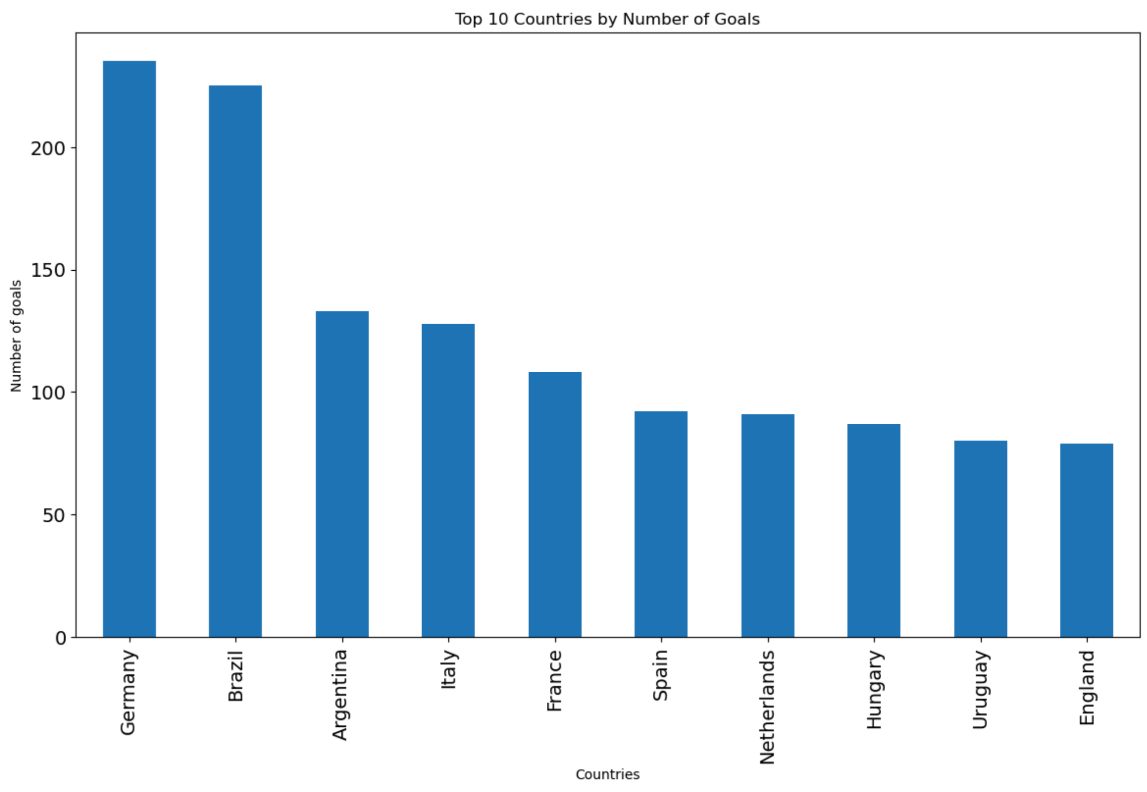


Which countries had won the cup?

In [50]:
```
gold = world_cup["Winner"]
silver = world_cup["Runners-Up"]
bronze = world_cup["Third"]

# Creating DataFrames with specific column names
gold_count = pd.DataFrame(gold.value_counts()).rename(columns={'Winner': 'co
silver_count = pd.DataFrame(silver.value_counts()).rename(columns={'Runners-
bronze_count = pd.DataFrame(bronze.value_counts()).rename(columns={'Third':

# Joining the counts into a single DataFrame
podium_count = gold_count.join(silver_count, how='outer').join(bronze_count,
podium_count = podium_count.fillna(0)
podium_count = podium_count.astype('int64')
podium_count = podium_count.sort_values(by=['WINNER', 'SECOND', 'THIRD'], as

# Plotting
podium_count.plot(y=['WINNER', 'SECOND', 'THIRD'], kind="bar",
                  color=['gold', 'silver', 'brown'], figsize=(14, 8), fonts
                  width=0.8, align='center')
plt.xlabel('Countries')
plt.ylabel('Number of podiums')
plt.title('Number of podiums by country')
plt.show()
```



In [51]:
```
# Number of goals per Country
home = matches[['Home Team Name', 'Home Team Goals']].dropna()
away = matches[['Away Team Name', 'Away Team Goals']].dropna()

# Rename columns to a common format
home = home.rename(columns={'Home Team Name': 'countries', 'Home Team Goals
away = away.rename(columns={'Away Team Name': 'countries', 'Away Team Goals

# Concatenate the two DataFrames
goal_per_country = pd.concat([home, away])

# Ensure 'goals' column is of type int
goal_per_country['goals'] = goal_per_country['goals'].astype('int64')

# Group by 'countries' and sum the goals, then sort by the number of goals
goal_per_country = goal_per_country.groupby('countries')['goals'].sum().sor

# Plotting the top 10 countries
goal_per_country[:10].plot(kind="bar", figsize=(14, 8), fontsize=14)
plt.xlabel('Countries')
plt.ylabel('Number of goals')
plt.title('Top 10 Countries by Number of Goals')
plt.show()
```



In [52]:
```
# Match outcome by Home and Away Teams
def get_labels(matches):
    if matches['Home Team Goals'] > matches['Away Team Goals']:
        return 'Home Team Win'
    if matches['Home Team Goals'] < matches['Away Team Goals']:
        return 'Away Team Win'
    return 'DRAW'

matches['outcome'] = matches.apply(lambda x: get_labels(x), axis=1)
```

In [53]:
```
matches.head()
```

Out[53]:

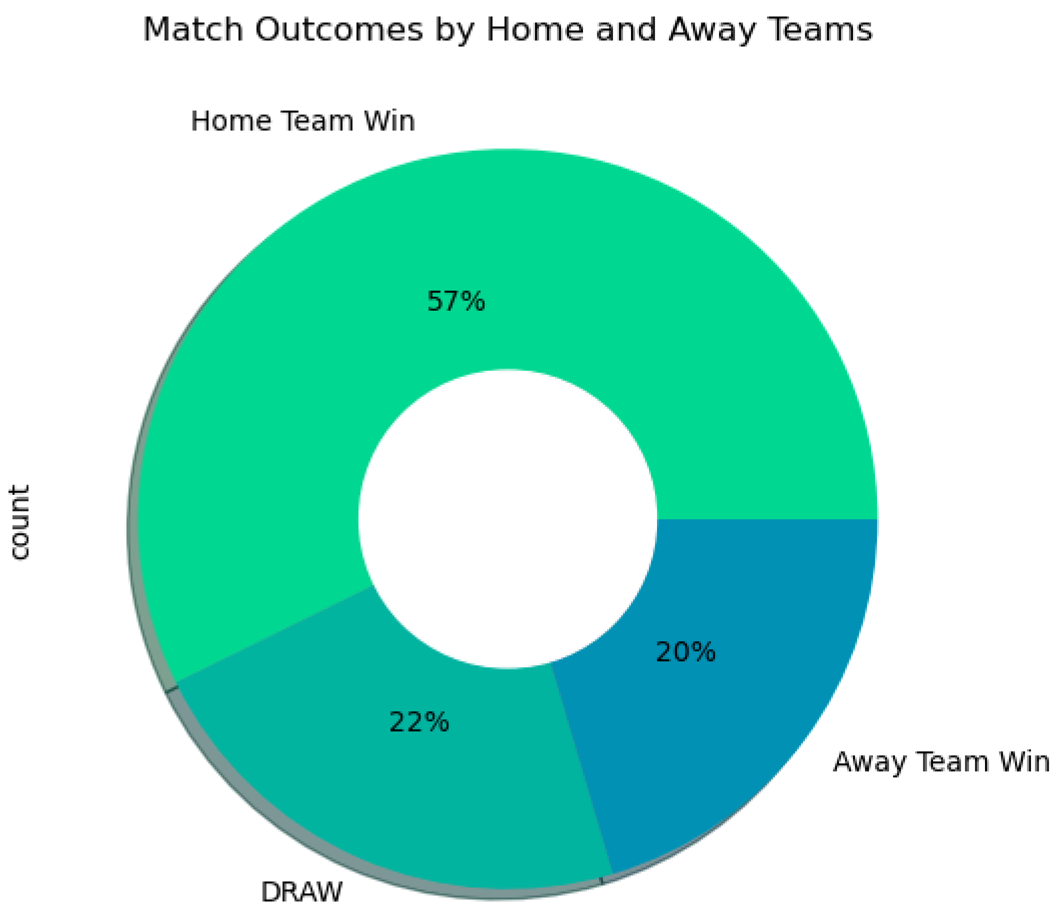
	Year	Datetime	Stage	Stadium	City	Home Team Name	Home Team Goals	Away Team Goals	Away Team Name	Win conditions
0	1930	13 Jul, 30	Group 1	Pocitos	Montevideo	France	4.0	1.0	Mexico	
1	1930	13 Jul, 30	Group 4	Parque Central	Montevideo	USA	3.0	0.0	Belgium	
2	1930	14 Jul, 30	Group 2	Parque Central	Montevideo	Yugoslavia	2.0	1.0	Brazil	
3	1930	14 Jul, 30	Group 3	Pocitos	Montevideo	Romania	3.0	1.0	Peru	
4	1930	15 Jul, 30	Group 1	Parque Central	Montevideo	Argentina	1.0	0.0	France	

5 rows × 21 columns

In [54]:
```
mt = matches['outcome'].value_counts()
mt
```

Out[54]:
```
outcome
Home Team Win    488
DRAW             190
Away Team Win    174
Name: count, dtype: int64
```

In [55]:
```
plt.figure(figsize = (6,6))

mt.plot.pie(autopct = "%1.0f%%", colors = sns.color_palette('winter_r'), sha

c = plt.Circle((0,0), 0.4, color =  'white')
plt.gca().add_artist(c)
plt.title('Match Outcomes by Home and Away Teams')
plt.show()
```



In [56]:
```
# We didn't considered draw matches here because in many cells we had NaN va
# had made our pie chart biased.

def winner(data1):
    if data1['Home Team Goals'] > data1['Away Team Goals']:
        return 'Home team won'
    elif data1['Home Team Goals'] < data1['Away Team Goals']:
        return 'Away Team won'
```

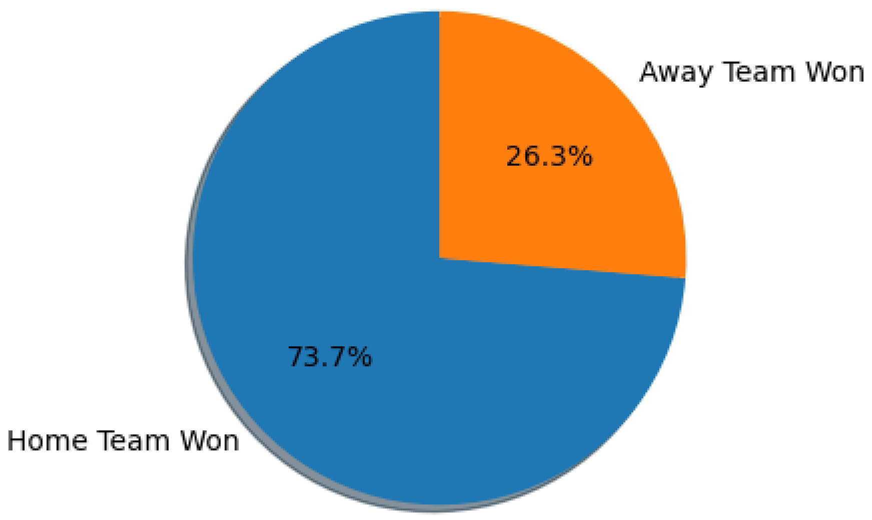
In [57]:
```
matches['winner']=matches.apply(lambda x:winner(x),axis=1)
```

In [58]:
```
matches['winner'].value_counts()
```

Out[58]:
```
winner
Home team won    488
Away Team won    174
Name: count, dtype: int64
```

In [59]:
```
sizes = [488, 174]
```

In [60]:
```
fig, ax = plt.subplots(figsize= (4, 4), dpi = 100)
explode = (0.1, 0, 0)
ax.pie(sizes, labels = ['Home Team Won','Away Team Won'], autopct = '%1.1f%
      startangle = 90)

plt.show()
```



In [61]:
```
players['Team Initials'].unique()
```

Out[61]:
```
array(['FRA', 'MEX', 'USA', 'BEL', 'YUG', 'BRA', 'ROU', 'PER', 'ARG',
       'CHI', 'BOL', 'PAR', 'URU', 'AUT', 'HUN', 'EGY', 'SUI', 'NED',
       'SWE', 'GER', 'ESP', 'ITA', 'TCH', 'INH', 'CUB', 'NOR', 'POL',
       'ENG', 'SCO', 'FRG', 'TUR', 'KOR', 'URS', 'WAL', 'NIR', 'COL',
       'BUL', 'PRK', 'POR', 'ISR', 'MAR', 'SLV', 'GDR', 'AUS', 'ZAI',
       'HAI', 'TUN', 'IRN', 'CMR', 'NZL', 'ALG', 'HON', 'KUW', 'CAN',
       'IRQ', 'DEN', 'UAE', 'CRC', 'IRL', 'KSA', 'RUS', 'GRE', 'NGA',
       'RSA', 'JPN', 'JAM', 'CRO', 'SEN', 'SVN', 'ECU', 'CHN', 'TRI',
       'CIV', 'SCG', 'ANG', 'CZE', 'GHA', 'TOG', 'UKR', 'SRB', 'SVK',
       'BIH'], dtype=object)
```

In [62]:
```
data_nat = pd.DataFrame(players[['Team Initials','Player Name']])
data_nat.head()
```

Out[62]:

	Team Initials	Player Name
0	FRA	Alex THEPOT
1	MEX	Oscar BONFIGLIO
2	FRA	Marcel LANGILLER
3	MEX	Juan CARRENO
4	FRA	Ernest LIBERATI

In [63]:
```
d2 = pd.DataFrame(data_nat['Team Initials'].value_counts())
d2
```

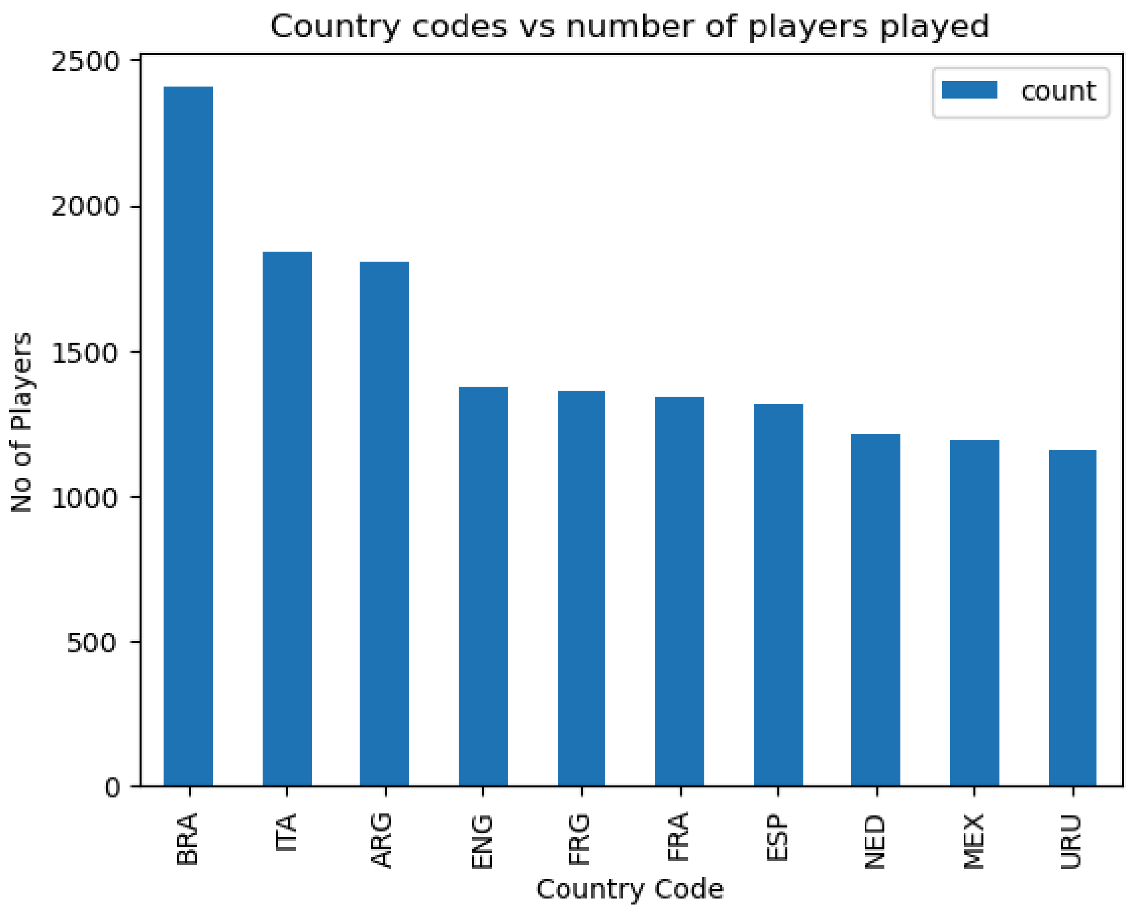
Out[63]:

	count
Team Initials	
BRA	2403
ITA	1843
ARG	1807
ENG	1378
FRG	1364
...	...
KUW	66
CAN	66
UAE	66
CUB	45
INH	18

82 rows × 1 columns

```
In [64]: plt.figure(figsize=(14,8))
         d2[:10].plot(kind='bar')
         plt.xlabel("Country Code")
         plt.ylabel("No of Players")
         plt.title("Country codes vs number of players played")
         plt.show()
```

```
<Figure size 1400x800 with 0 Axes>
```



Summary

- Brazil has won the tournament most number of times.
- A complete depection of number of world cups won, first runner-up, and sthirs positions by various participating teams.
- Germany scored the most number of goals thrughout the history of worldcup followed by Brazil and Argentina.
- Brazil has again scored a majority of total goals playing as home team whereas spain scored more goals playing as away country rather than home country.
- Mexico City have Maximum number of matches of World Cup.
- Most Team won their home matches.
- 73.6 % of the matches were won by home team while 26.4 % were won by away team.
- Brazil has played the most number of players followed by Italy and Argentina.

In [65]:
```
matches.to_csv('WorldCupMatches1.csv', index=False)
players.to_csv('WorldCupPlayers1.csv', index = False)
world_cup.to_csv('WorldCups1.csv', index = False)
```