In [10]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from numpy.random import randn
import random
```

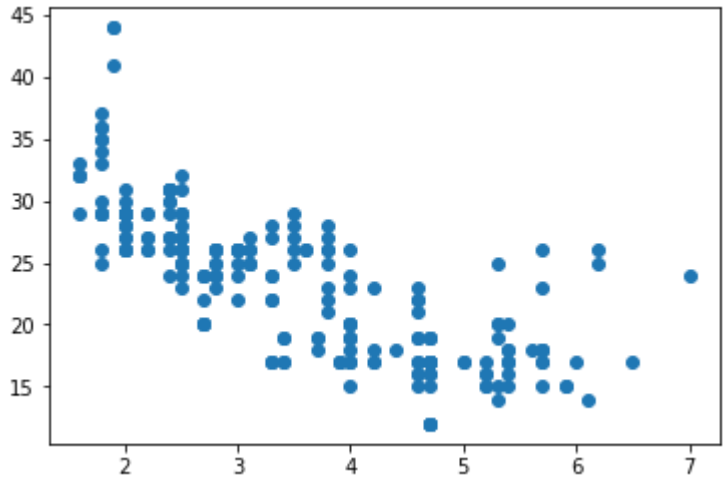
In [11]:
```
dfmpg = pd.read_csv("data/mpg.csv")
dfmpg
```

Out[11]:

	manufacturer	model	displ	year	cyl	trans	drv	cty	hwy	fl	class
0	audi	a4	1.8	1999	4	auto(l5)	f	18	29	p	compact
1	audi	a4	1.8	1999	4	manual(m5)	f	21	29	p	compact
2	audi	a4	2.0	2008	4	manual(m6)	f	20	31	p	compact
3	audi	a4	2.0	2008	4	auto(av)	f	21	30	p	compact
4	audi	a4	2.8	1999	6	auto(l5)	f	16	26	p	compact
...	...	...	...	...	...	...	...	...	...	...	...
229	volkswagen	passat	2.0	2008	4	auto(s6)	f	19	28	p	midsize
230	volkswagen	passat	2.0	2008	4	manual(m6)	f	21	29	p	midsize
231	volkswagen	passat	2.8	1999	6	auto(l5)	f	16	26	p	midsize
232	volkswagen	passat	2.8	1999	6	manual(m5)	f	18	26	p	midsize
233	volkswagen	passat	3.6	2008	6	auto(s6)	f	17	26	p	midsize

234 rows × 11 columns

In [12]:
```
fig = plt.figure()
ax = fig.add_subplot()
ax.scatter('displ', 'hwy',data=dfmpg);
```



In [13]:
```
df = dfmpg.groupby('manufacturer').size()
df
```

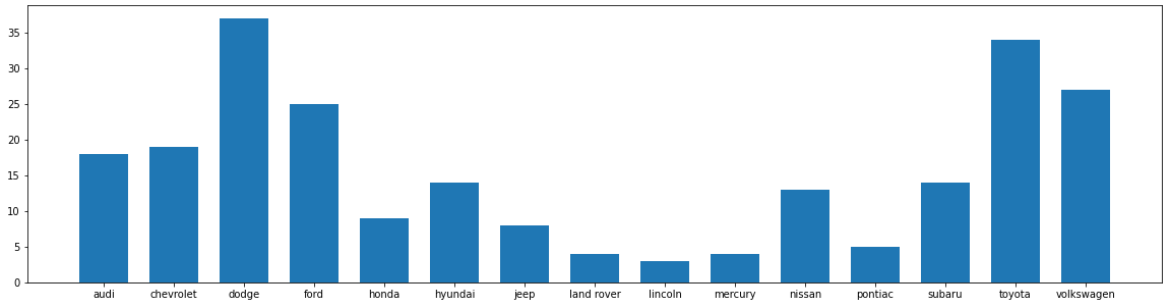
Out[13]:
```
manufacturer
audi          18
chevrolet     19
dodge         37
ford          25
honda          9
hyundai       14
jeep           8
land rover     4
lincoln        3
mercury        4
nissan        13
pontiac        5
subaru        14
toyota        34
volkswagen    27
dtype: int64
```

In [14]:
```
df = df.reset_index(name='counts')
df
```

Out[14]:

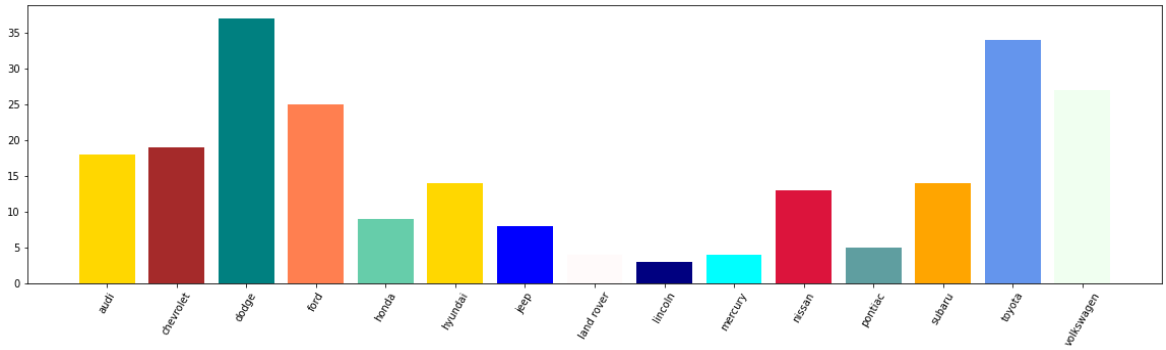
	manufacturer	counts
0	audi	18
1	chevrolet	19
2	dodge	37
3	ford	25
4	honda	9
5	hyundai	14
6	jeep	8
7	land rover	4
8	lincoln	3
9	mercury	4
10	nissan	13
11	pontiac	5
12	subaru	14
13	toyota	34
14	volkswagen	27

In [15]:
```
plt.figure(figsize=(20,5))
plt.bar(df['manufacturer'], df['counts'], width=.7)
plt.show()
```



In [16]:
```
plt.figure(figsize=(20,5))

x = list(plt.cm.colors.cnames.keys())
n = df['manufacturer'].unique().__len__()

plt.bar(df['manufacturer'], df['counts'], color=random.choices(x, k=n+1))

plt.gca().set_xticklabels(df['manufacturer'], rotation=60)

plt.show()
```

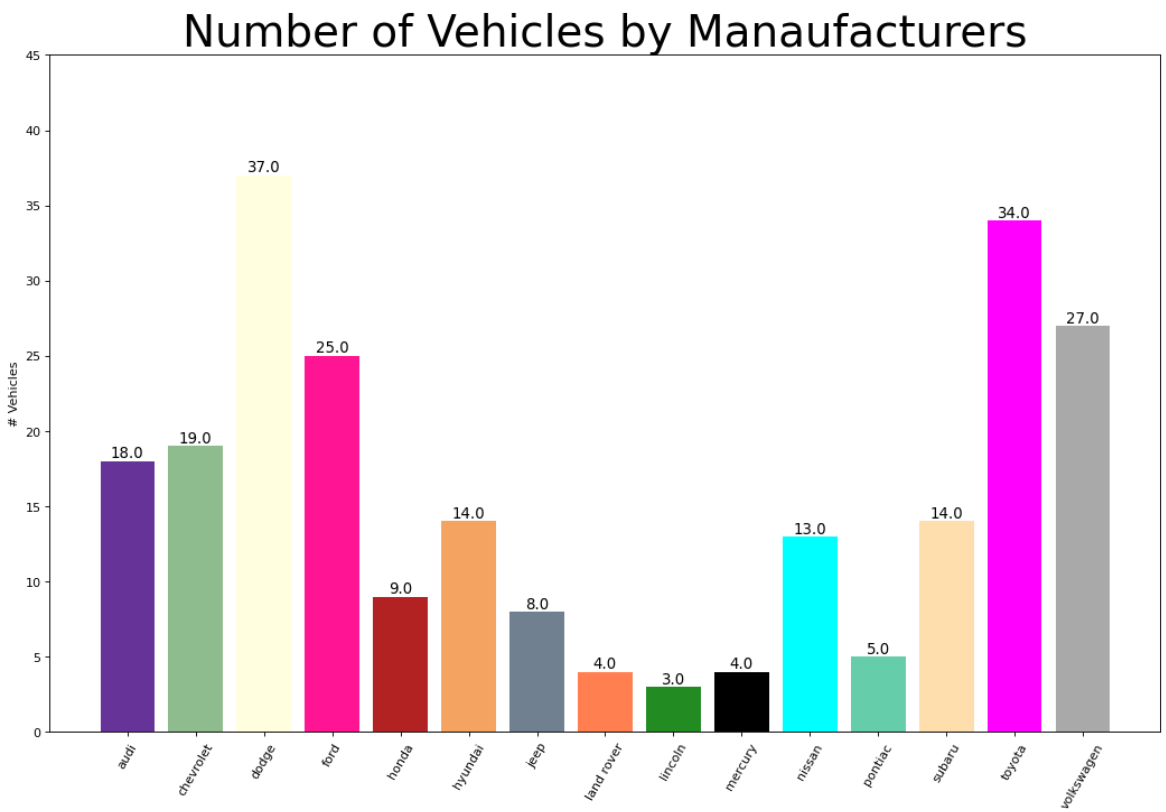
```
<ipython-input-16-7ad912983f2f>:8: UserWarning: FixedFormatter should only
be used together with FixedLocator
  plt.gca().set_xticklabels(df['manufacturer'], rotation=60)
```



In [17]:

```
plt.figure(figsize=(16,10), dpi= 80)

x = list(plt.cm.colors.cnames.keys())
n = df['manufacturer'].unique().__len__()

plt.bar(df['manufacturer'], df['counts'], color=random.choices(x, k=n+1))

for i, val in enumerate(df['counts'].values):
    plt.text(i, val, float(val), horizontalalignment='center',
             verticalalignment='bottom', fontdict={'fontweight':500, 'size':12

plt.gca().set_xticklabels(df['manufacturer'], rotation=60)

plt.title("Number of Vehicles by Manaufacturers", fontsize=35)
plt.ylabel('# Vehicles')
plt.ylim(0, 45)
plt.show()
```

```
<ipython-input-17-8b1a5802542d>:12: UserWarning: FixedFormatter should only
be used together with FixedLocator
  plt.gca().set_xticklabels(df['manufacturer'], rotation=60)
```



دانشگاه شهید مدنی آذربایجان
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امین گلزاری اسکوئی
۱۴۰۰-۱۴۰۱

Codes and Projects (click here) (https://github.com/Amin-Golzari-Oskouei/Python-Programming-Course-Advanced-2021) slides and videos (click here) (https://drive.google.com/drive/folders/1Dx3v7fD1QBWL-MNP2hd7iIxaRbeALkkA)