

```
In [14]: import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib as plt
import matplotlib.pyplot as pl
import warnings
warnings.filterwarnings('ignore')
```

```
In [15]: data=pd.read_csv("C:/Users/Admin/Downloads/insurance.csv")
```

In [16]: data

Out[16]:

	age	sex	bmi	children	smoker	region	charges
0	19	female	27.900	0	yes	southwest	16884.92400
1	18	male	33.770	1	no	southeast	1725.55230
2	28	male	33.000	3	no	southeast	4449.46200
3	33	male	22.705	0	no	northwest	21984.47061
4	32	male	28.880	0	no	northwest	3866.85520
5	31	female	25.740	0	no	southeast	3756.62160
6	46	female	33.440	1	no	southeast	8240.58960
7	37	female	27.740	3	no	northwest	7281.50560
8	37	male	29.830	2	no	northeast	6406.41070
9	60	female	25.840	0	no	northwest	28923.13692
10	25	male	26.220	0	no	northeast	2721.32080
11	62	female	26.290	0	yes	southeast	27808.72510
12	23	male	34.400	0	no	southwest	1826.84300
13	56	female	39.820	0	no	southeast	11090.71780
14	27	male	42.130	0	yes	southeast	39611.75770
15	19	male	24.600	1	no	southwest	1837.23700
16	52	female	30.780	1	no	northeast	10797.33620
17	23	male	23.845	0	no	northeast	2395.17155
18	56	male	40.300	0	no	southwest	10602.38500
19	30	male	35.300	0	yes	southwest	36837.46700
20	60	female	36.005	0	no	northeast	13228.84695
21	30	female	32.400	1	no	southwest	4149.73600
22	18	male	34.100	0	no	southeast	1137.01100
23	34	female	31.920	1	yes	northeast	37701.87680
24	37	male	28.025	2	no	northwest	6203.90175
25	59	female	27.720	3	no	southeast	14001.13380
26	63	female	23.085	0	no	northeast	14451.83515
27	55	female	32.775	2	no	northwest	12268.63225
28	23	male	17.385	1	no	northwest	2775.19215
29	31	male	36.300	2	yes	southwest	38711.00000
...
1308	25	female	30.200	0	yes	southwest	33900.65300
1309	41	male	32.200	2	no	southwest	6875.96100
1310	42	male	26.315	1	no	northwest	6940.90985
1311	33	female	26.695	0	no	northwest	4571.41305
1312	34	male	42.900	1	no	southwest	4536.25900
1313	19	female	34.700	2	yes	southwest	36397.57600

	age	sex	bmi	children	smoker	region	charges
1314	30	female	23.655	3	yes	northwest	18765.87545
1315	18	male	28.310	1	no	northeast	11272.33139
1316	19	female	20.600	0	no	southwest	1731.67700
1317	18	male	53.130	0	no	southeast	1163.46270
1318	35	male	39.710	4	no	northeast	19496.71917
1319	39	female	26.315	2	no	northwest	7201.70085
1320	31	male	31.065	3	no	northwest	5425.02335
1321	62	male	26.695	0	yes	northeast	28101.33305
1322	62	male	38.830	0	no	southeast	12981.34570
1323	42	female	40.370	2	yes	southeast	43896.37630
1324	31	male	25.935	1	no	northwest	4239.89265
1325	61	male	33.535	0	no	northeast	13143.33665
1326	42	female	32.870	0	no	northeast	7050.02130
1327	51	male	30.030	1	no	southeast	9377.90470
1328	23	female	24.225	2	no	northeast	22395.74424
1329	52	male	38.600	2	no	southwest	10325.20600
1330	57	female	25.740	2	no	southeast	12629.16560
1331	23	female	33.400	0	no	southwest	10795.93733
1332	52	female	44.700	3	no	southwest	11411.68500
1333	50	male	30.970	3	no	northwest	10600.54830
1334	18	female	31.920	0	no	northeast	2205.98080
1335	18	female	36.850	0	no	southeast	1629.83350
1336	21	female	25.800	0	no	southwest	2007.94500
1337	61	female	29.070	0	yes	northwest	29141.36030

1338 rows × 7 columns

In [17]: data.head()

Out[17]:

	age	sex	bmi	children	smoker	region	charges
0	19	female	27.900	0	yes	southwest	16884.92400
1	18	male	33.770	1	no	southeast	1725.55230
2	28	male	33.000	3	no	southeast	4449.46200
3	33	male	22.705	0	no	northwest	21984.47061
4	32	male	28.880	0	no	northwest	3866.85520

```
In [18]: data.isnull().sum()
```

```
Out[18]: age          0  
sex          0  
bmi          0  
children     0  
smoker       0  
region       0  
charges      0  
dtype: int64
```

```
In [19]: Gender=data['sex']=pd.get_dummies(data['sex'],drop_first=True)
```

In [20]: Gender

Out[20]:

	male
0	0
1	1
2	1
3	1
4	1
5	0
6	0
7	0
8	1
9	0
10	1
11	0
12	1
13	0
14	1
15	1
16	0
17	1
18	1
19	1
20	0
21	0
22	1
23	0
24	1
25	0
26	0
27	0
28	1
29	1
...	...
1308	0
1309	1
1310	1
1311	0
1312	1
1313	0

	male
1314	0
1315	1
1316	0
1317	1
1318	1
1319	0
1320	1
1321	1
1322	1
1323	0
1324	1
1325	1
1326	0
1327	1
1328	0
1329	1
1330	0
1331	0
1332	0
1333	1
1334	0
1335	0
1336	0
1337	0

1338 rows × 1 columns

```
In [21]: Smoker=data['smoker']=pd.get_dummies(data['smoker'],drop_first=True)
```

In [22]:

Smoker

Out[22]:

	yes
0	1
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	1
12	0
13	0
14	1
15	0
16	0
17	0
18	0
19	1
20	0
21	0
22	0
23	1
24	0
25	0
26	0
27	0
28	0
29	1
...	...
1308	1
1309	0
1310	0
1311	0
1312	0
1313	1

	yes
1314	1
1315	0
1316	0
1317	0
1318	0
1319	0
1320	0
1321	1
1322	0
1323	1
1324	0
1325	0
1326	0
1327	0
1328	0
1329	0
1330	0
1331	0
1332	0
1333	0
1334	0
1335	0
1336	0
1337	1

1338 rows × 1 columns

```
In [23]: Region=data['region']=pd.get_dummies(data['region'],drop_first=True)
```


In [24]:

Region

Out[24]:

	northwest	southeast	southwest
0	0	0	1
1	0	1	0
2	0	1	0
3	1	0	0
4	1	0	0
5	0	1	0
6	0	1	0
7	1	0	0
8	0	0	0
9	1	0	0
10	0	0	0
11	0	1	0
12	0	0	1
13	0	1	0
14	0	1	0
15	0	0	1
16	0	0	0
17	0	0	0
18	0	0	1
19	0	0	1
20	0	0	0
21	0	0	1
22	0	1	0
23	0	0	0
24	1	0	0
25	0	1	0
26	0	0	0
27	1	0	0
28	1	0	0
29	0	0	1
...
1308	0	0	1
1309	0	0	1
1310	1	0	0
1311	1	0	0
1312	0	0	1
1313	0	0	1

	northwest	southeast	southwest
1314	1	0	0
1315	0	0	0
1316	0	0	1
1317	0	1	0
1318	0	0	0
1319	1	0	0
1320	1	0	0
1321	0	0	0
1322	0	1	0
1323	0	1	0
1324	1	0	0
1325	0	0	0
1326	0	0	0
1327	0	1	0
1328	0	0	0
1329	0	0	1
1330	0	1	0
1331	0	0	1
1332	0	0	1
1333	1	0	0
1334	0	0	0
1335	0	1	0
1336	0	0	1
1337	1	0	0

1338 rows × 3 columns

```
In [25]: new_data=pd.concat([data,Region,Smoker,Gender],axis=1)
```

In [26]: new_data

Out[26]:

	age	sex	bmi	children	smoker	region	charges	northwest	southeast	southwest	yes	male
0	19	0	27.900	0	1	0	16884.92400	0	0	1	1	0
1	18	1	33.770	1	0	0	1725.55230	0	1	0	0	1
2	28	1	33.000	3	0	0	4449.46200	0	1	0	0	1
3	33	1	22.705	0	0	1	21984.47061	1	0	0	0	1
4	32	1	28.880	0	0	1	3866.85520	1	0	0	0	1
5	31	0	25.740	0	0	0	3756.62160	0	1	0	0	0
6	46	0	33.440	1	0	0	8240.58960	0	1	0	0	0
7	37	0	27.740	3	0	1	7281.50560	1	0	0	0	0
8	37	1	29.830	2	0	0	6406.41070	0	0	0	0	1
9	60	0	25.840	0	0	1	28923.13692	1	0	0	0	0
10	25	1	26.220	0	0	0	2721.32080	0	0	0	0	1
11	62	0	26.290	0	1	0	27808.72510	0	1	0	1	0
12	23	1	34.400	0	0	0	1826.84300	0	0	1	0	1
13	56	0	39.820	0	0	0	11090.71780	0	1	0	0	0
14	27	1	42.130	0	1	0	39611.75770	0	1	0	1	1
15	19	1	24.600	1	0	0	1837.23700	0	0	1	0	1
16	52	0	30.780	1	0	0	10797.33620	0	0	0	0	0
17	23	1	23.845	0	0	0	2395.17155	0	0	0	0	1
18	56	1	40.300	0	0	0	10602.38500	0	0	1	0	1
19	30	1	35.300	0	1	0	36837.46700	0	0	1	1	1
20	60	0	36.005	0	0	0	13228.84695	0	0	0	0	0
21	30	0	32.400	1	0	0	4149.73600	0	0	1	0	0
22	18	1	34.100	0	0	0	1137.01100	0	1	0	0	1
23	34	0	31.920	1	1	0	37701.87680	0	0	0	1	0
24	37	1	28.025	2	0	1	6203.90175	1	0	0	0	1
25	59	0	27.720	3	0	0	14001.13380	0	1	0	0	0
26	63	0	23.085	0	0	0	14451.83515	0	0	0	0	0
27	55	0	32.775	2	0	1	12268.63225	1	0	0	0	0
28	23	1	17.385	1	0	1	2775.19215	1	0	0	0	1
29	31	1	36.300	2	1	0	38711.00000	0	0	1	1	1
...
1308	25	0	30.200	0	1	0	33900.65300	0	0	1	1	0
1309	41	1	32.200	2	0	0	6875.96100	0	0	1	0	1
1310	42	1	26.315	1	0	1	6940.90985	1	0	0	0	1
1311	33	0	26.695	0	0	1	4571.41305	1	0	0	0	0
1312	34	1	42.900	1	0	0	4536.25900	0	0	1	0	1
1313	19	0	34.700	2	1	0	36397.57600	0	0	1	1	0

	age	sex	bmi	children	smoker	region	charges	northwest	southeast	southwest	yes	male
1314	30	0	23.655	3	1	1	18765.87545	1	0	0	1	0
1315	18	1	28.310	1	0	0	11272.33139	0	0	0	0	1
1316	19	0	20.600	0	0	0	1731.67700	0	0	1	0	0
1317	18	1	53.130	0	0	0	1163.46270	0	1	0	0	1
1318	35	1	39.710	4	0	0	19496.71917	0	0	0	0	1
1319	39	0	26.315	2	0	1	7201.70085	1	0	0	0	0
1320	31	1	31.065	3	0	1	5425.02335	1	0	0	0	1
1321	62	1	26.695	0	1	0	28101.33305	0	0	0	1	1
1322	62	1	38.830	0	0	0	12981.34570	0	1	0	0	1
1323	42	0	40.370	2	1	0	43896.37630	0	1	0	1	0
1324	31	1	25.935	1	0	1	4239.89265	1	0	0	0	1
1325	61	1	33.535	0	0	0	13143.33665	0	0	0	0	1
1326	42	0	32.870	0	0	0	7050.02130	0	0	0	0	0
1327	51	1	30.030	1	0	0	9377.90470	0	1	0	0	1
1328	23	0	24.225	2	0	0	22395.74424	0	0	0	0	0
1329	52	1	38.600	2	0	0	10325.20600	0	0	1	0	1
1330	57	0	25.740	2	0	0	12629.16560	0	1	0	0	0
1331	23	0	33.400	0	0	0	10795.93733	0	0	1	0	0
1332	52	0	44.700	3	0	0	11411.68500	0	0	1	0	0
1333	50	1	30.970	3	0	1	10600.54830	1	0	0	0	1
1334	18	0	31.920	0	0	0	2205.98080	0	0	0	0	0
1335	18	0	36.850	0	0	0	1629.83350	0	1	0	0	0
1336	21	0	25.800	0	0	0	2007.94500	0	0	1	0	0
1337	61	0	29.070	0	1	1	29141.36030	1	0	0	1	0

1338 rows × 12 columns

```
In [27]: new_data=new_data.drop(['sex','region','smoker'],axis=1)
```

In [28]: new_data

Out[28]:

	age	bmi	children	charges	northwest	southeast	southwest	yes	male
0	19	27.900	0	16884.92400	0	0	1	1	0
1	18	33.770	1	1725.55230	0	1	0	0	1
2	28	33.000	3	4449.46200	0	1	0	0	1
3	33	22.705	0	21984.47061	1	0	0	0	1
4	32	28.880	0	3866.85520	1	0	0	0	1
5	31	25.740	0	3756.62160	0	1	0	0	0
6	46	33.440	1	8240.58960	0	1	0	0	0
7	37	27.740	3	7281.50560	1	0	0	0	0
8	37	29.830	2	6406.41070	0	0	0	0	1
9	60	25.840	0	28923.13692	1	0	0	0	0
10	25	26.220	0	2721.32080	0	0	0	0	1
11	62	26.290	0	27808.72510	0	1	0	1	0
12	23	34.400	0	1826.84300	0	0	1	0	1
13	56	39.820	0	11090.71780	0	1	0	0	0
14	27	42.130	0	39611.75770	0	1	0	1	1
15	19	24.600	1	1837.23700	0	0	1	0	1
16	52	30.780	1	10797.33620	0	0	0	0	0
17	23	23.845	0	2395.17155	0	0	0	0	1
18	56	40.300	0	10602.38500	0	0	1	0	1
19	30	35.300	0	36837.46700	0	0	1	1	1
20	60	36.005	0	13228.84695	0	0	0	0	0
21	30	32.400	1	4149.73600	0	0	1	0	0
22	18	34.100	0	1137.01100	0	1	0	0	1
23	34	31.920	1	37701.87680	0	0	0	1	0
24	37	28.025	2	6203.90175	1	0	0	0	1
25	59	27.720	3	14001.13380	0	1	0	0	0
26	63	23.085	0	14451.83515	0	0	0	0	0
27	55	32.775	2	12268.63225	1	0	0	0	0
28	23	17.385	1	2775.19215	1	0	0	0	1
29	31	36.300	2	38711.00000	0	0	1	1	1
...
1308	25	30.200	0	33900.65300	0	0	1	1	0
1309	41	32.200	2	6875.96100	0	0	1	0	1
1310	42	26.315	1	6940.90985	1	0	0	0	1
1311	33	26.695	0	4571.41305	1	0	0	0	0
1312	34	42.900	1	4536.25900	0	0	1	0	1
1313	19	34.700	2	36397.57600	0	0	1	1	0

	age	bmi	children	charges	northwest	southeast	southwest	yes	male
1314	30	23.655	3	18765.87545	1	0	0	1	0
1315	18	28.310	1	11272.33139	0	0	0	0	1
1316	19	20.600	0	1731.67700	0	0	1	0	0
1317	18	53.130	0	1163.46270	0	1	0	0	1
1318	35	39.710	4	19496.71917	0	0	0	0	1
1319	39	26.315	2	7201.70085	1	0	0	0	0
1320	31	31.065	3	5425.02335	1	0	0	0	1
1321	62	26.695	0	28101.33305	0	0	0	1	1
1322	62	38.830	0	12981.34570	0	1	0	0	1
1323	42	40.370	2	43896.37630	0	1	0	1	0
1324	31	25.935	1	4239.89265	1	0	0	0	1
1325	61	33.535	0	13143.33665	0	0	0	0	1
1326	42	32.870	0	7050.02130	0	0	0	0	0
1327	51	30.030	1	9377.90470	0	1	0	0	1
1328	23	24.225	2	22395.74424	0	0	0	0	0
1329	52	38.600	2	10325.20600	0	0	1	0	1
1330	57	25.740	2	12629.16560	0	1	0	0	0
1331	23	33.400	0	10795.93733	0	0	1	0	0
1332	52	44.700	3	11411.68500	0	0	1	0	0
1333	50	30.970	3	10600.54830	1	0	0	0	1
1334	18	31.920	0	2205.98080	0	0	0	0	0
1335	18	36.850	0	1629.83350	0	1	0	0	0
1336	21	25.800	0	2007.94500	0	0	1	0	0
1337	61	29.070	0	29141.36030	1	0	0	1	0

1338 rows × 9 columns

In [29]: `new_data.head()`

Out[29]:

	age	bmi	children	charges	northwest	southeast	southwest	yes	male
0	19	27.900	0	16884.92400	0	0	1	1	0
1	18	33.770	1	1725.55230	0	1	0	0	1
2	28	33.000	3	4449.46200	0	1	0	0	1
3	33	22.705	0	21984.47061	1	0	0	0	1
4	32	28.880	0	3866.85520	1	0	0	0	1

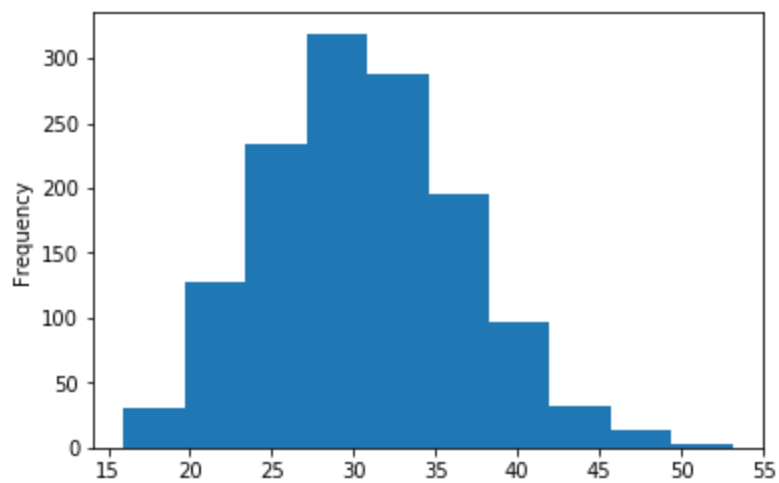
```
In [30]: new_data.head()
```

```
Out[30]:
```

	age	bmi	children	charges	northwest	southeast	southwest	yes	male
0	19	27.900	0	16884.92400	0	0	1	1	0
1	18	33.770	1	1725.55230	0	1	0	0	1
2	28	33.000	3	4449.46200	0	1	0	0	1
3	33	22.705	0	21984.47061	1	0	0	0	1
4	32	28.880	0	3866.85520	1	0	0	0	1

```
In [31]: new_data['bmi'].plot.hist()
```

```
Out[31]: <matplotlib.axes._subplots.AxesSubplot at 0xb7dfc18>
```



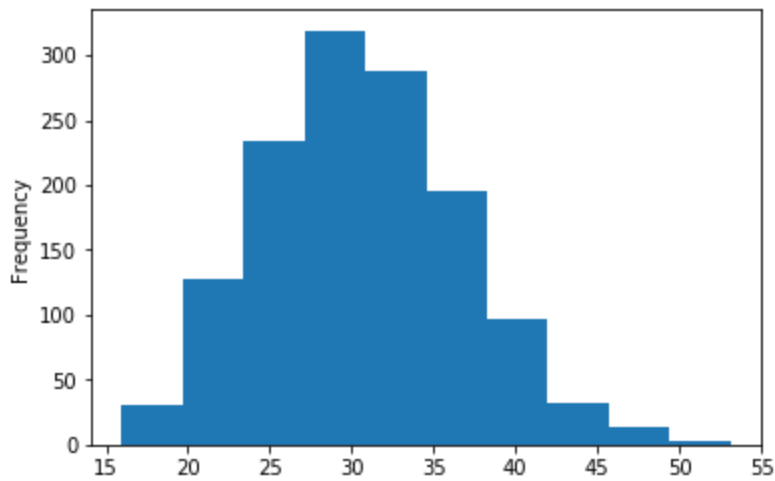
```
In [32]: data.head()
```

```
Out[32]:
```

	age	sex	bmi	children	smoker	region	charges
0	19	0	27.900	0	1	0	16884.92400
1	18	1	33.770	1	0	0	1725.55230
2	28	1	33.000	3	0	0	4449.46200
3	33	1	22.705	0	0	1	21984.47061
4	32	1	28.880	0	0	1	3866.85520

```
In [33]: data['bmi'].plot.hist()
```

```
Out[33]: <matplotlib.axes._subplots.AxesSubplot at 0xb690dd8>
```



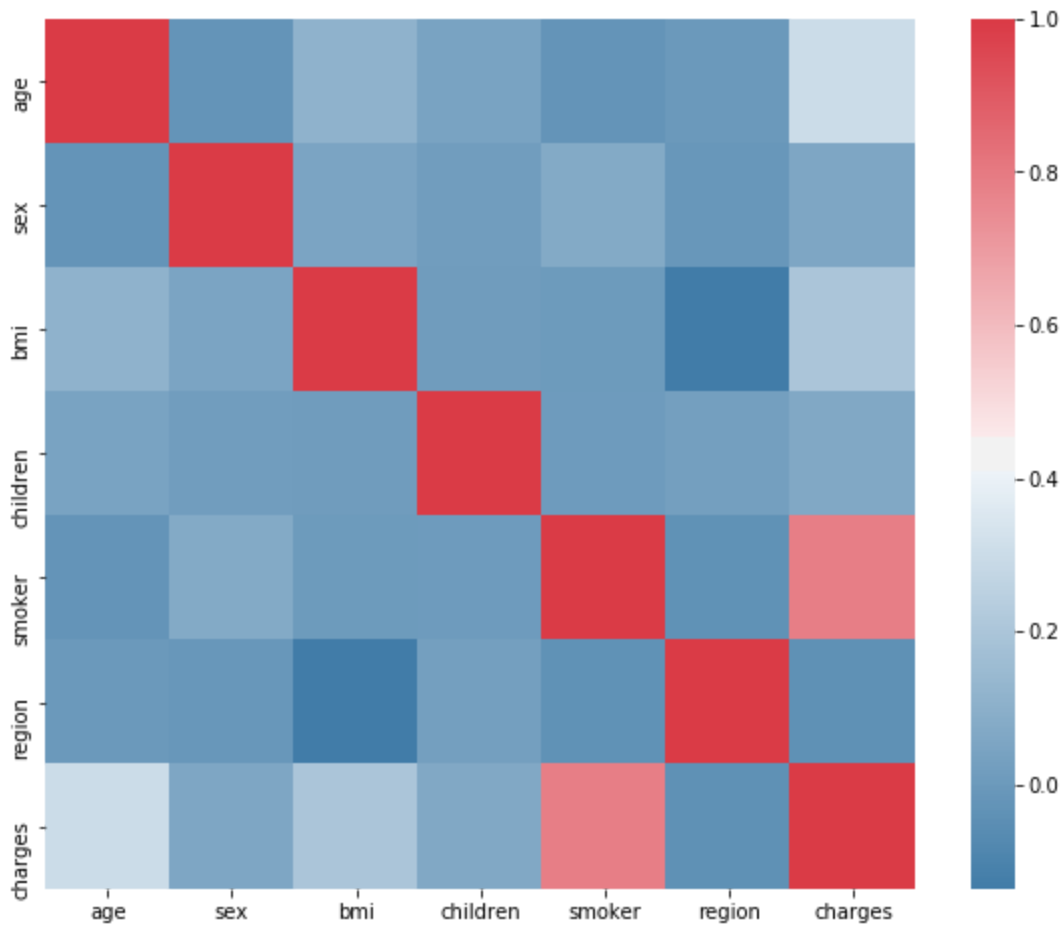
```
In [34]: new_data.corr()['charges'].sort_values()
```

```
Out[34]: southwest    -0.043210
northwest    -0.039905
male          0.057292
children      0.067998
southeast     0.073982
bmi           0.198341
age           0.299008
yes           0.787251
charges       1.000000
Name: charges, dtype: float64
```



```
In [35]: f, ax=plt.subplots(figsize=(10,8))  
corr=data.corr()  
sns.heatmap(corr,mask=np.zeros_like(corr,dtype=np.bool),cmap=sns.diverging_palette(240,10,
```

```
Out[35]: <matplotlib.axes._subplots.AxesSubplot at 0xb61dcc0>
```



```

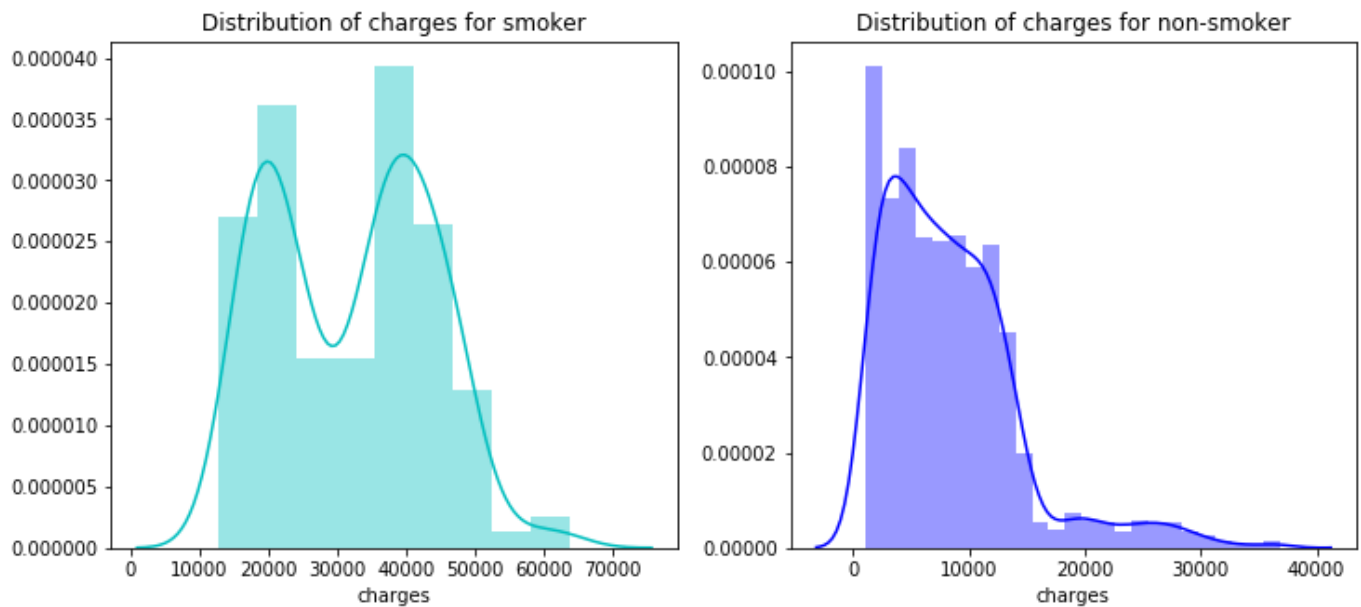
In [36]: f=plt.figure(figsize=(12,5))

ax=f.add_subplot(121)
sns.distplot(new_data[(new_data.yes==1)][ "charges"],color='c',ax=ax)
ax.set_title('Distribution of charges for smoker')

ax=f.add_subplot(122)
sns.distplot(new_data[(new_data.yes==0)][ 'charges'],color='b',ax=ax)
ax.set_title('Distribution of charges for non-smoker')

```

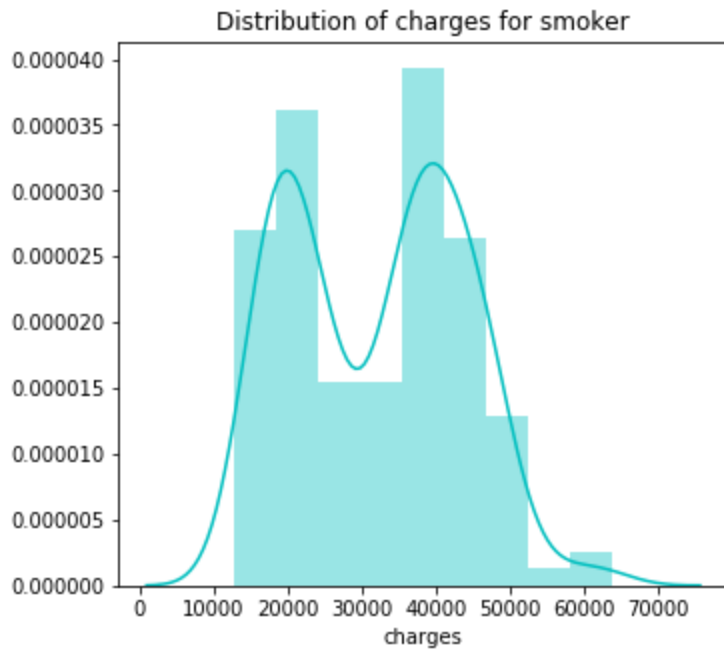
Out[36]: Text(0.5, 1.0, 'Distribution of charges for non-smoker')



```
In [37]: f=plt.figure(figsize=(12,5))

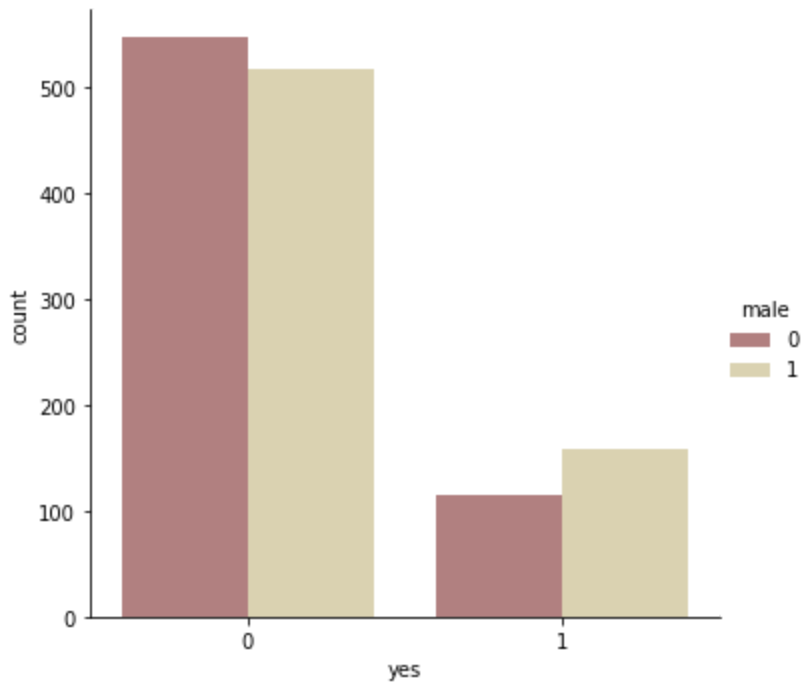
ax=f.add_subplot(121)
sns.distplot(new_data[(new_data.yes==1)][ "charges"],color='c',ax=ax)
ax.set_title('Distribution of charges for smoker')
```

Out[37]: Text(0.5, 1.0, 'Distribution of charges for smoker')



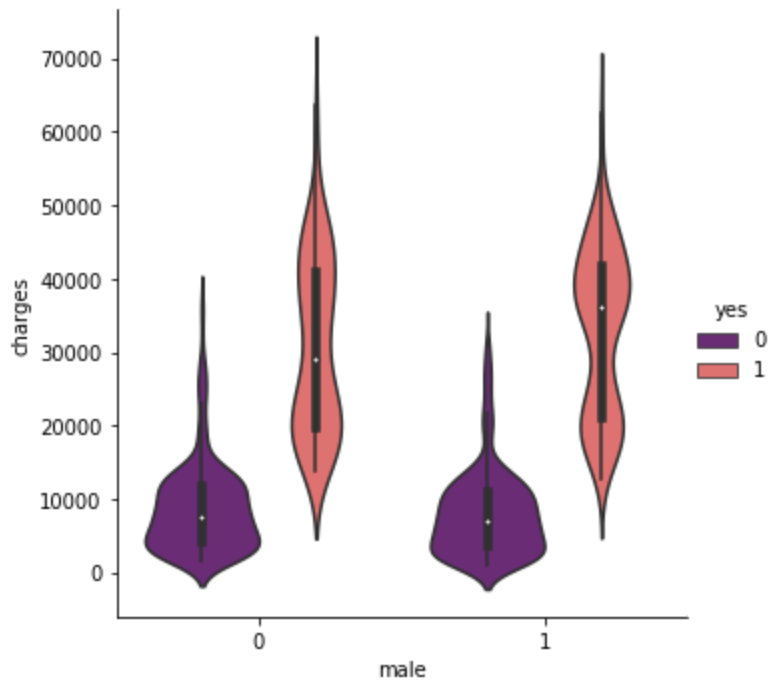
```
In [38]: sns.catplot(x="yes",kind="count",hue="male",palette="pink",data=new_data)
```

```
Out[38]: <seaborn.axisgrid.FacetGrid at 0xbbacd30>
```



```
In [39]: sns.catplot(x="male",y="charges",hue="yes",kind="violin",data=new_data,palette='magma')
```

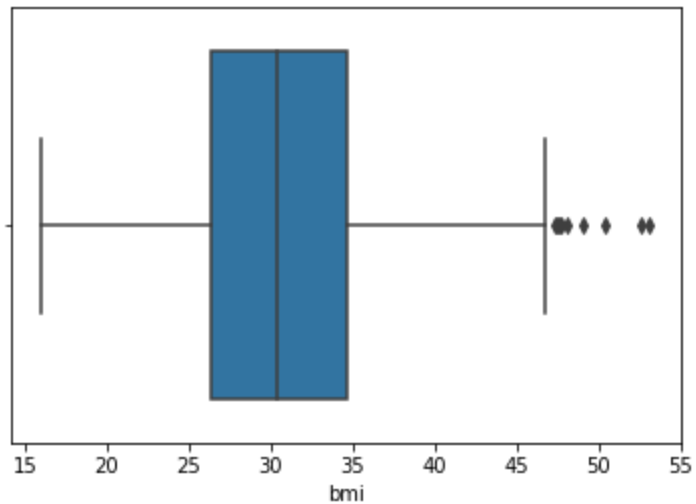
```
Out[39]: <seaborn.axisgrid.FacetGrid at 0xbdfcd68>
```



```
In [40]: new_data['bmi']=np.where(new_data["bmi"]>=56,56,new_data['bmi'])
```

```
In [41]: sns.boxplot(new_data['bmi'])
```

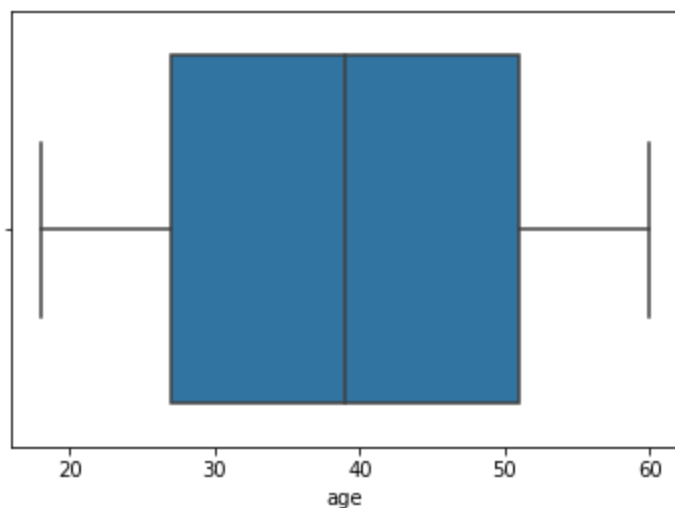
```
Out[41]: <matplotlib.axes._subplots.AxesSubplot at 0xbe4d5c0>
```



```
In [42]: new_data['age'] = np.where(new_data["age"] >= 55, 60, new_data['age'])
```

```
In [43]: sns.boxplot(new_data['age'])
```

```
Out[43]: <matplotlib.axes._subplots.AxesSubplot at 0xbeab668>
```



```
In [44]: from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import PolynomialFeatures
from sklearn.metrics import r2_score, mean_squared_error
```

```
In [45]: x=new_data.drop(['charges'],axis=1)
```

```
In [46]: y=data.charges
```

```
In [47]: x_train,x_test,y_train,y_test=train_test_split(x,y,random_state=0)
```

```
In [48]: lr=LinearRegression().fit(x_train,y_train)
```

```
In [49]: y_train_pred=lr.predict(x_train)
```

```
In [50]: y_train_pred=lr.predict(x_train)
```

```
In [51]: print(lr.score(x_test,y_test))
```

```
0.7954965048149671
```

```
x=newdata.drop(['charges','region'],axis=1)
```

```
In [52]: x=new_data.drop(['charges','northwest'],axis=1)
```

```
In [53]: y=new_data.charges
```

```
In [54]: quad=PolynomialFeatures(degree=2)
x_quad=quad.fit_transform(x)
x_train,x_test,y_train,y_test=train_test_split(x_quad,y,random_state=0)
lr=LinearRegression().fit(x_train,y_train)
y_train_pred=lr.predict(x_train)
y_test_pred=lr.predict(x_test)
print(lr.score(x_test,y_test))
```

```
0.852231248738031
```

```
In [55]: quad=PolynomialFeatures(degree=2)
```

```
In [56]: x_quad=quad.fit_transform(x)
```

```
In [57]: x_train,x_test,y_train,y_test=train_test_split(x_quad,y,random_state=0)
```

```
In [58]: lr=LinearRegression().fit(x_train,y_train)
```

```
In [59]: y_train_pred=lr.predict(x_train)
```

```
In [60]: y_test_pred=lr.predict(x_test)
```

```
In [61]: print(lr.score(x_test,y_test))
```

```
0.852231248738031
```

```
In [62]: y_test_pred
```

```
Out[62]: array([10326.53125, 8431.875 , 47540.21875, 11915.84375, 9868.9375 ,
 5335.34375, 1954.125 , 15771.84375, 12589.40625, 9654.53125,
 8155. , 13186.3125 , 10713.96875, 4354.75 , 24621.8125 ,
 9742.21875, 12832.21875, 5345.03125, 9781. , 26011.28125,
 25105.9375 , 15481.75 , 12473.8125 , 31386.125 , 4971.71875,
 7279.0625 , 2208.46875, 6936.125 , 3836.1875 , 11700.625 ,
 12856.8125 , 51864.53125, 10855.125 , 10882.5 , 12363.5 ,
 6566.34375, 11217.46875, 35169.78125, 38267.4375 , 4628.78125,
 6087.09375, 7634.40625, 24544.34375, 44218.21875, 36338.9375 ,
 6255.40625, 9740.125 , 9380.0625 , 5281.59375, 11634.3125 ,
 5609.46875, 6012.0625 , 27900.875 , 47585.78125, 9202.21875,
 5551.25 , 6301.21875, 10865.34375, 15262.9375 , 13400.1875 ,
 835.375 , 36998.59375, 16081.6875 , 9867.53125, 16433.21875,
 11571.96875, 28769.5625 , 36634.09375, -1724.125 , 14528.09375,
 14747.8125 , 16280.40625, 20002.375 , 10737.84375, 13274. ,
 13669.90625, 9143.03125, 11963.96875, 25230.3125 , 41022.75 ,
 13748.4375 , 54532.96875, 3394.875 , 8702.78125, 38474.6875 ,
 24592.46875, 5817.53125, 4610.34375, 12128.75 , 35208.28125,
 11752.4375 , 12335.1875 , 6518.8125 , 7839.96875, 7235.28125,
 8363.875 , 35068.9375 , 29742.59375, 9366.53125, 9971.46875,
 5395.0625 , 8364.21875, 2633.875 , 40245.8125 , 29841.25 ,
 3589.96875, 12642.34375, 7089.84375, 12527.625 , 37618.75 ,
 14739.15625, 5403.15625, 12031.46875, 27062.65625, 52925.15625,
 10486.59375, -570.3125 , 10443.71875, 10569.53125, 13220.96875,
 42279. , 10216.21875, 13132.1875 , 9706.65625, 10813.78125,
 5299.53125, 28502.71875, 20624.5 , 46311.09375, 3425.125 ,
 7581.78125, 2861.6875 , 5866.78125, 10592.9375 , 30578.71875,
 29770.3125 , 27964.125 , 8997.0625 , 24006.875 , 3484.90625,
 4154.84375, 12984. , 12078.125 , 11781.6875 , 6810.15625,
 10950.9375 , 10281.125 , 4246.25 , -202.5625 , 12254.03125,
 9284.5625 , 47706.6875 , 11851.90625, 2786.4375 , 5351.375 ,
 6462.5 , 3862.6875 , 2743.1875 , 15156.78125, 15041.09375,
 8570.4375 , 13778.875 , 13509.1875 , 8505.03125, 4995.03125,
 10024.25 , 14448.5625 , 10671.6875 , 6157.0625 , -485.5 ,
 6887.40625, 6292.84375, 12219.5625 , 5551.21875, 4223.34375,
 7347.65625, 5146.28125, 7617.4375 , 35479.25 , 748.96875,
 14197.84375, 11394.78125, 12637.84375, 6805.34375, 7234.21875,
 29215.125 , 3346.6875 , 3364.21875, 13780.53125, 13695.28125,
 35226.9375 , 1767.25 , 8374.6875 , 29301.46875, 4649.5 ,
 2332.5 , 9559.75 , 11961.90625, 6603.9375 , 6450.9375 ,
 13435.75 , 44609.78125, 15511.25 , 19744.6875 , 7376. ,
 42435.5 , 4746.8125 , 13982.78125, 4749.53125, 2303.71875,
 11233.53125, 13808.59375, 8704.96875, 5643.46875, 7668.90625,
 1894.53125, 10685.375 , 6362.1875 , 12096.34375, 6868.0625 ,
 9160.34375, 11279.0625 , 12361.75 , 3591.46875, 14393.3125 ,
 12013.4375 , 10081.65625, 14720.1875 , 10266.34375, 5922.84375,
 3378. , 10253. , 11124.28125, 8833.21875, 3216.875 ,
 7739.75 , 11824.84375, 27890.3125 , 8487.3125 , 13390.625 ,
 9717.1875 , 35462.96875, 10178.1875 , 9669.625 , 12928.6875 ,
 12271.59375, 3444.78125, 11377. , 2379.75 , 8692.875 ,
 26220.96875, 39615.09375, 6244.4375 , 968.25 , 2802.125 ,
 -192.1875 , 8441.03125, -316.875 , 9137.4375 , 1210.84375,
 12637.9375 , 31905.03125, 36947.15625, 15497.40625, 9365.4375 ,
 11478.9375 , 41119.5625 , 13072.21875, 34491.625 , 3399.9375 ,
 40364.53125, 5094.625 , 14368.3125 , 6182.5625 , 40108.84375,
 9132.90625, 14733.15625, 15842.25 , 3307.625 , 14254.09375,
 13639.40625, 7228.15625, 12965.53125, 3047.53125, 8805.71875,
 2977.1875 , 9459.25 , 26200.65625, 3428.9375 , 566.3125 ,
 934.03125, 45964.46875, 11135.125 , 8241.71875, 15492.03125,
```


14368.3125 , 32286.75 , 9739.28125, 5962.21875, 9509.84375,
2107.875 , 3656.375 , 6818.28125, 20651.28125, 11983.09375,
3414.9375 , 1595.8125 , 9554.15625, 11385.3125 , 12366.40625,
28597.625 , 8844.8125 , 14530.09375, 3496.78125, 9175.65625,
9092.46875, 10525.84375, 1532.3125 , 9055.84375, 47705.6875 ,
6908. , 7022.96875, 961.625 , 9008.40625, 3524.3125 ,
12228.5 , 42313.46875, 16541.71875, 11453.21875, 44917.5 ,
15460.84375, 7415.3125 , 13892.71875, 2961.03125, 35420.46875])