```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
#
```

```

df=pd.read_csv('/content/insurance.csv')
df
```

	age	sex	bmi	children	smoker	region	expenses
0	19	female	27.9	0	yes	southwest	16884.92
1	18	male	33.8	1	no	southeast	1725.55
2	28	male	33.0	3	no	southeast	4449.46
3	33	male	22.7	0	no	northwest	21984.47
4	32	male	28.9	0	no	northwest	3866.86
...	...	...	...	...	...	...	...
1333	50	male	31.0	3	no	northwest	10600.55
1334	18	female	31.9	0	no	northeast	2205.98
1335	18	female	36.9	0	no	southeast	1629.83
1336	21	female	25.8	0	no	southwest	2007.95
1337	61	female	29.1	0	yes	northwest	29141.36

1338 rows × 7 columns

Next steps: Generate code with df   View recommended plots   New interactive sheet

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1338 entries, 0 to 1337
Data columns (total 7 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       1338 non-null   int64  
 1   sex       1338 non-null   object 
 2   bmi       1338 non-null   float64
 3   children  1338 non-null   int64  
 4   smoker    1338 non-null   object 
 5   region    1338 non-null   object 
 6   expenses  1338 non-null   float64
dtypes: float64(2), int64(2), object(3)
memory usage: 73.3+ KB
```

```
df.columns
```

```
Index(['age', 'sex', 'bmi', 'children', 'smoker', 'region', 'expenses'], dtype='object')
```

```

df.tail()
```

	age	sex	bmi	children	smoker	region	expenses
1333	50	male	31.0	3	no	northwest	10600.55
1334	18	female	31.9	0	no	northeast	2205.98
1335	18	female	36.9	0	no	southeast	1629.83
1336	21	female	25.8	0	no	southwest	2007.95
1337	61	female	29.1	0	yes	northwest	29141.36

```
df.shape
```

```
(1338, 7)
```

```
df.duplicated().sum()
```

```
1
```

```
df.drop_duplicates(inplace=True)
```

```
df.isnull().sum()
```

```
age         0
sex         0
bmi         0
children    0
smoker      0
region      0
expenses    0
dtype: int64
```

No Duplicates and No null values are present in Dataset

```
df.describe()
```

	age	bmi	children	expenses
count	1337.000000	1337.000000	1337.000000	1337.000000
mean	39.222139	30.665520	1.095737	13279.121638
std	14.044333	6.100664	1.205571	12110.359657
min	18.000000	16.000000	0.000000	1121.870000
25%	27.000000	26.300000	0.000000	4746.340000
50%	39.000000	30.400000	1.000000	9386.160000
75%	51.000000	34.700000	2.000000	16657.720000
max	64.000000	53.100000	5.000000	63770.430000

using describe we can see the min,max age,childeren they have ,bmi and avg expenses of people

```
df.sex.unique()
```

```
array(['female', 'male'], dtype=object)
```

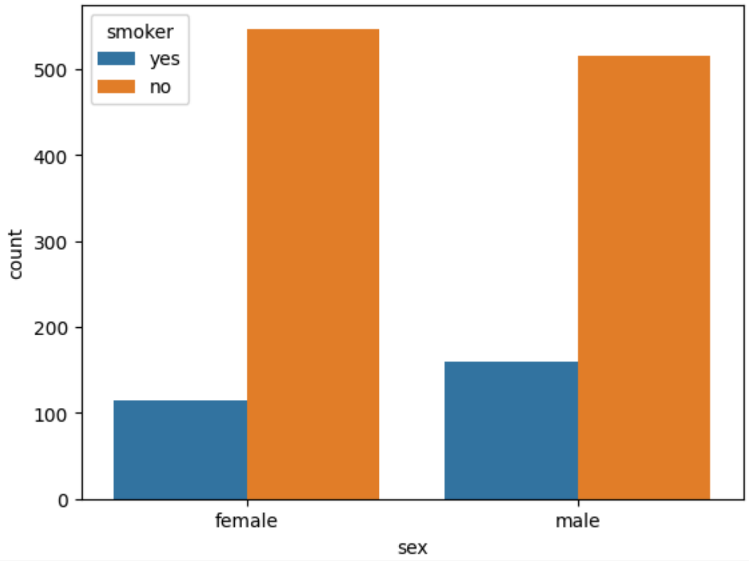
No of smoker based on sex

```
#no of smoker counts based on sex
smoker_count = df.groupby(['sex'])['smoker'].value_counts().unstack()
smoker_count
```

smoker	no	yes
sex		
female	547	115
male	516	159

Next steps: Generate code with `smoker_count` View recommended plots New interactive sheet

```
#count or smokers based on sex
sns.countplot(x='sex',hue='smoker',data=df)
plt.show()
```



There is more number of male smokers

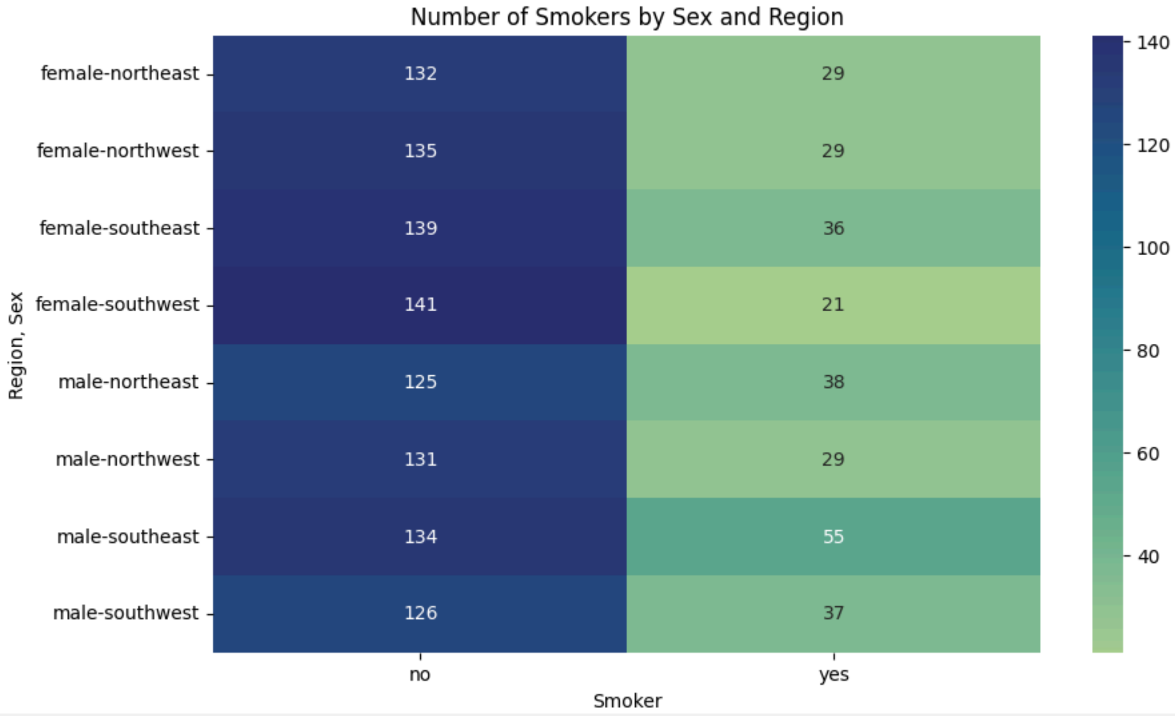
No of smoker based on sex and region

```
#no of smoker counts based on sex and region
smoker_count = df.groupby(['sex', 'region'])['smoker'].value_counts().unstack()
smoker_count
```

```
           smoker    no   yes
   sex     region
female  northeast   132    29
        northwest   135    29
        southeast   139    36
        southwest   141    21
  male  northeast   125    38
        northwest   131    29
        southeast   134    55
        southwest   126    37
```

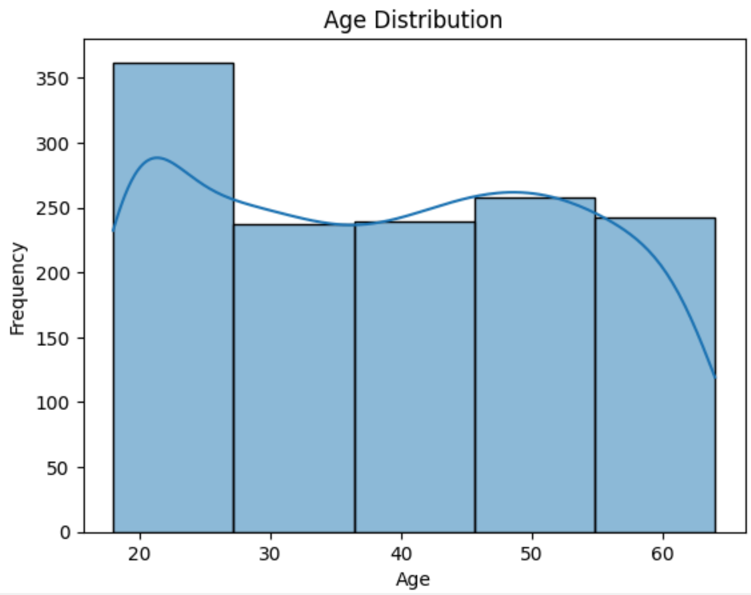
Next steps: Generate code with smoker_count View recommended plots New interactive sheet

```

# Convert the counts to integers for better readability in annotations
annot = smoker_count.astype(int).astype(str)

plt.figure(figsize=(10, 6))
sns.heatmap(smoker_count, annot=annot,fmt="",cmap="crest" )#fmt used for additional formating of annot and in this case it's empty mean r
plt.title('Number of Smokers by Sex and Region')
plt.xlabel('Smoker')
plt.ylabel('Region, Sex')
plt.show()

```

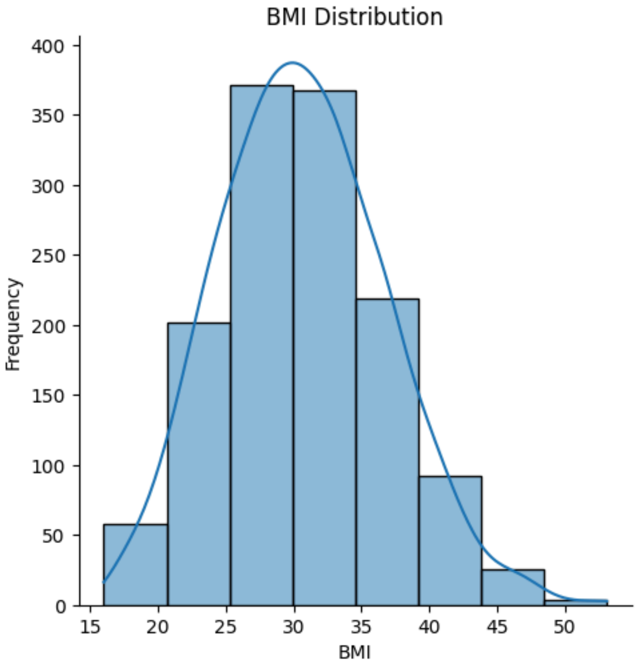


The highest number of male smokers is in the Southeast and the highest number of female smokers are in southeast

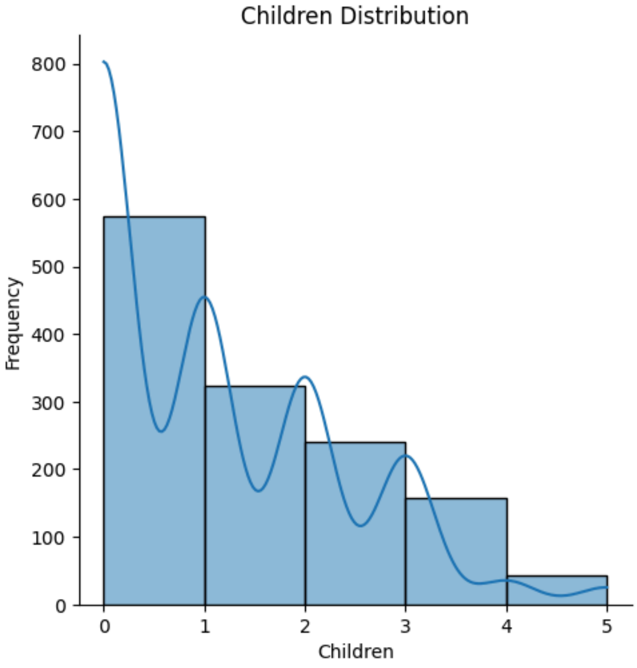
```
#histogram for age
sns.histplot(df['age'],bins=5,kde=True)
plt.title('Age Distribution')
plt.xlabel('Age')
plt.ylabel('Frequency')
plt.show()
```



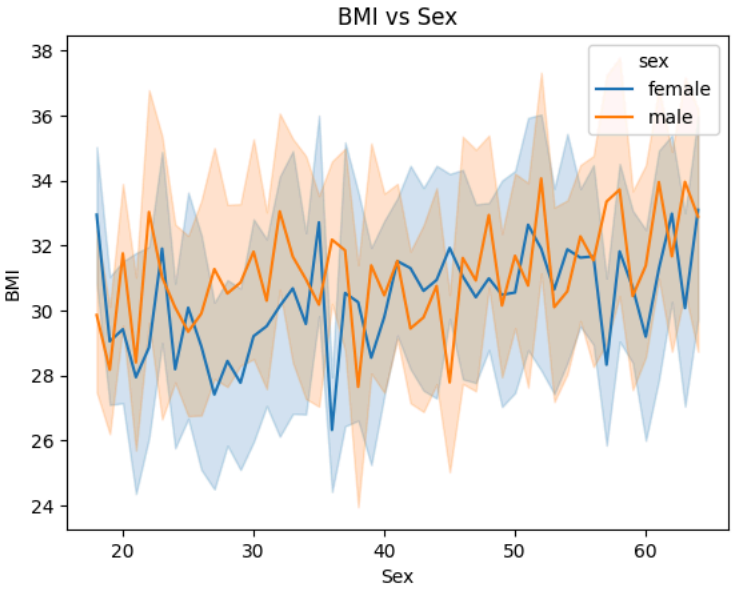
```
#histogram for bmi
sns.displot(df['bmi'],bins=8,kde=True)
plt.title('BMI Distribution')
plt.xlabel('BMI')
plt.ylabel('Frequency')
plt.show()
```



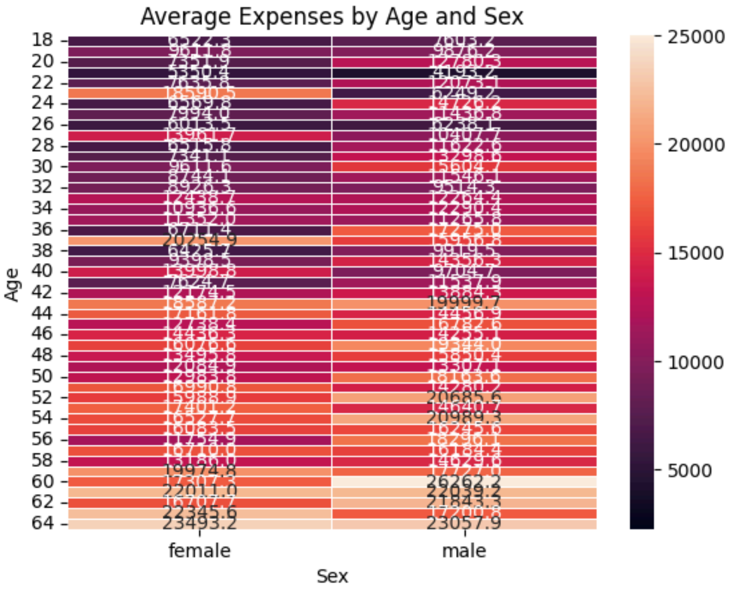
```
#histogram for children distribution
sns.displot(df['children'],bins=5,kde=True)
plt.title('Children Distribution')
plt.xlabel('Children')
plt.ylabel('Frequency')
plt.show()
#
```



```
# lineplot graph of bmi vs age
sns.lineplot(x='age',y='bmi',data=df,hue="sex")
plt.title('BMI vs Sex')
plt.xlabel('Sex')
plt.ylabel('BMI')
plt.show()

```



```
# heatplot for distribution of expenses according to age grouped by sex
pivot_table = df.pivot_table(values='expenses', index='age', columns='sex', aggfunc='mean')
#convert pivot table string value to int for better represntation

sns.heatmap(pivot_table,vmax=2500,vmin=25000,annot=True, fmt=".1f",linewidth=.5)
plt.title('Average Expenses by Age and Sex')
plt.xlabel('Sex')
plt.ylabel('Age')
plt.figure(figsize=(2000, 9000))
plt.show()

```

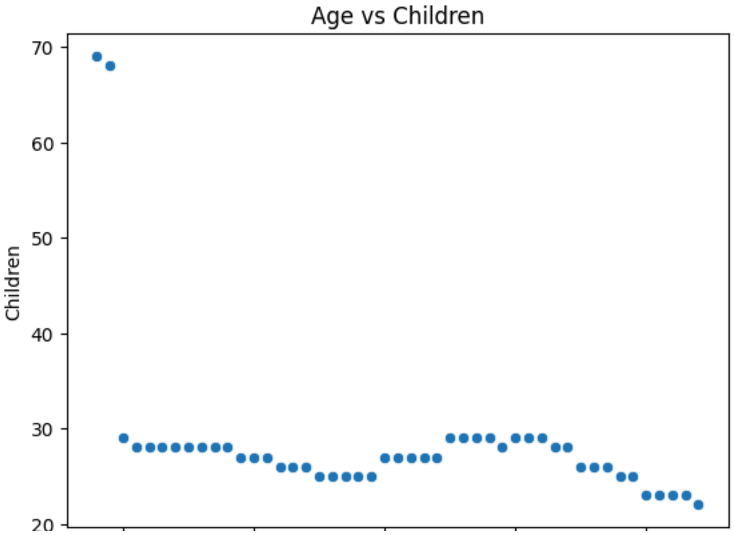


```
<Figure size 200000x900000 with 0 Axes>
```

```
#children as per age
children_age=df.groupby('age')['children'].count().reset_index()
"""print(children_age)"""
"""sns.lineplot(x='age',y='children',data=df)
plt.title('Age vs Children')
plt.xlabel('Age')
plt.ylabel('Children')
plt.show()"""


sns.barplot(x='age',y='children',data=children_age,palette="hls")
plt.title('Age vs Children')
plt.xlabel('Age')
plt.ylabel('Children')
plt.xticks(rotation=90)
plt.show()


#
```

```
     age  children
```

```
sns.scatterplot(x='age',y='children',data=children_age) # Corrected function name from scartterplot to scatterplot
plt.title('Age vs Children')
plt.xlabel('Age')
plt.ylabel('Children')
plt.xticks(rotation=90)
plt.show()
```


Age vs Children
Children