In [1]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

Loading Data

In [2]:
```
data = pd.read_csv("Automobile_data.csv")
```

In [3]:
```
automobile_df = pd.DataFrame(data, columns = ['make', 'fuel-type','body-style','curb-weight','num-of-cyl
```

In [4]:
```
df_data = automobile_df.replace('?',np.NAN)
df_data.isnull().sum()
```

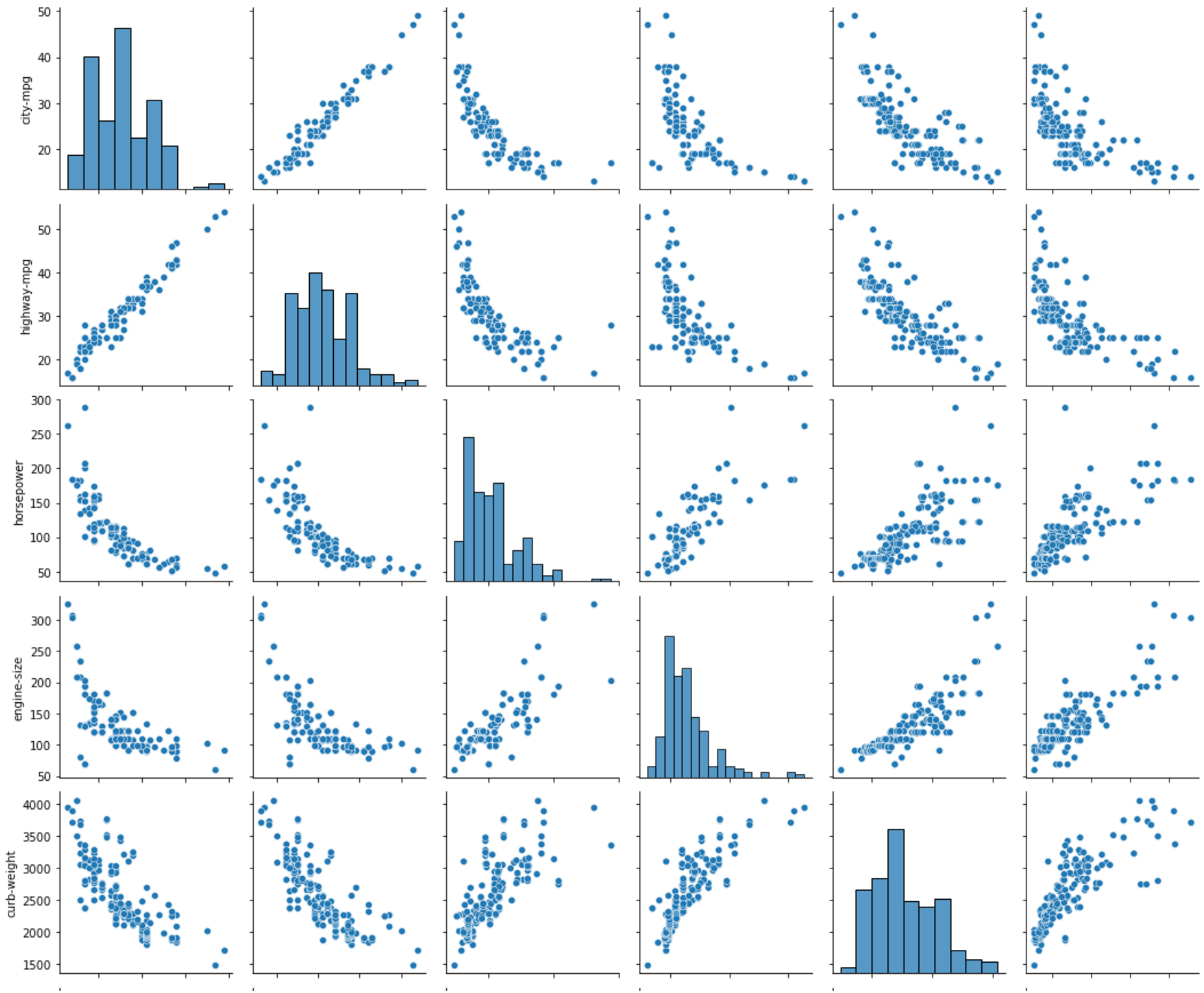
Out[4]:
```
make                 0
fuel-type            0
body-style           0
curb-weight          0
num-of-cylinders     0
engine-size          0
horsepower           2
city-mpg             0
highway-mpg          0
price                4
dtype: int64
```

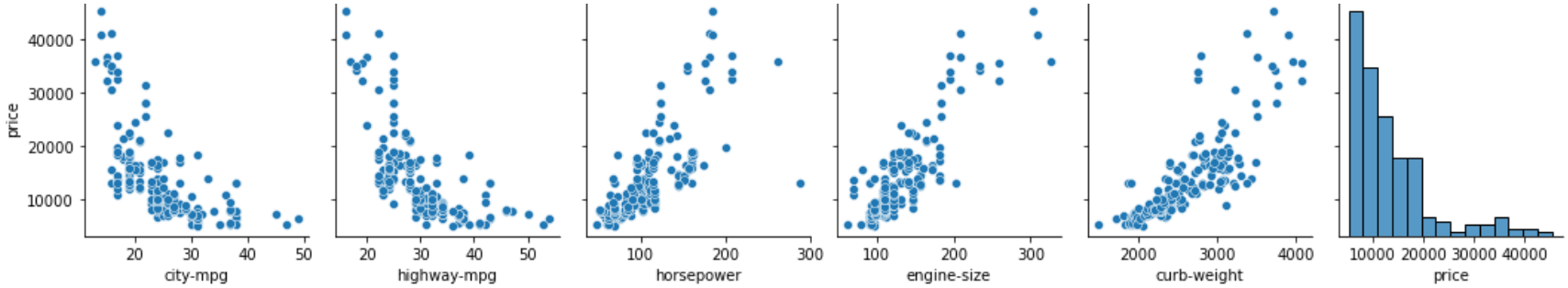
In [5]:
```
df_temp = automobile_df[automobile_df['price']!='?']
normalised_mean = df_temp['price'].astype(int).mean()
automobile_df['price'] = automobile_df['price'].replace('?',normalised_mean).astype(int)

df_temp = automobile_df[automobile_df['horsepower']!='?']
normalised_mean = df_temp['horsepower'].astype(int).mean()
automobile_df['horsepower'] = automobile_df['horsepower'].replace('?',normalised_mean).astype(int)
```

Quantitative vs. Quantitative

In [6]:
```
g = sns.pairplot(automobile_df[["city-mpg","highway-mpg", "horsepower", "engine-size", "curb-weight","pr
```



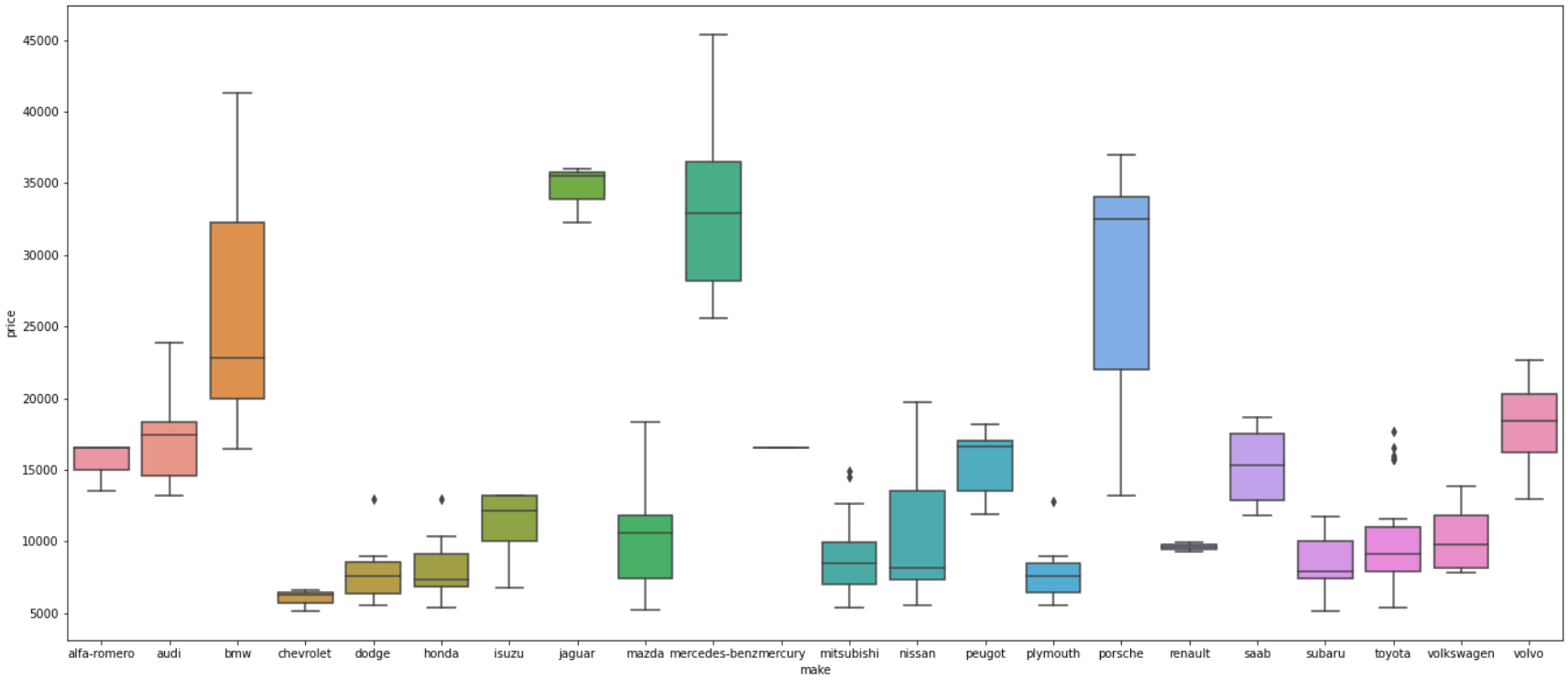


Findings

- City-MPG is strongly correlated with Highway-MPG
- As the price,curb weight,engine size,horsepower of vehicle decreases, the city-mpg (fuel efficiency) increases.
- The city-mpg shows negative correlation with price,curb weight,engine size,horsepower
- Car pricing has positive correlation with its engine size,horsepower,curb-weight.
- As the horsepower increase the engine size increases
- Curbweight increases with the increase in engine size

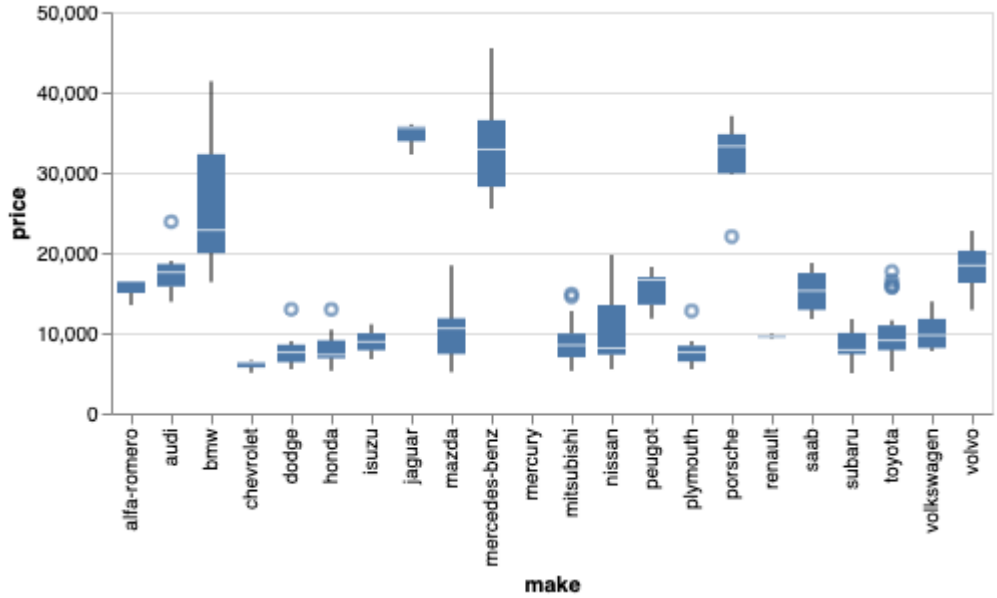
Quantitative vs. Categorical

In [7]:
```
plt.rcParams['figure.figsize']=(23,10)
ax = sns.boxplot(x="make", y="price", data=automobile_df)
```



In [ ]:

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "data": {
    "url": "https://raw.githubusercontent.com/asma512/Vis/main/Automobile_data.csv",
    "format": {
      "type": "csv",
        "parse": {
        "make": "string",
        "fuel-type": "string",
        "body-style": "string",
        "curb-weight": "number",
        "num-of-cylinders": "string",
        "engine-size": "number",
        "horsepower": "number",
        "city-mpg": "number",
        "highway-mpg": "number",
        "price": "number"
      }
    }
  },
  "mark": "boxplot",
  "encoding": {
    "x": {"field": "city-mpg", "type": "quantitative"},
    "y": {"field": "price", "type": "quantitative"}
  }
}
```



Findings

- Mercedes produces the most expensive car at 45400
- Mercedes Benzes, BMW, Porsche, and Jaguar(in order) produces expensive cars which are more than 30000
- Chevrolet, Dodge, Honda, Isuzu, Mitsubishi, Plymouth, Subaru, Toyota mostly produces budget friendly cars less than 10000
- Subaru produces the most affordable car at 5118
- Most of the car companies produces car below 20000

Categorical vs. Categorical

In [ ]:

```
{
  "$schema": "https://vega.github.io/schema/vega-lite/v5.json",
  "data": {
    "url": "https://raw.githubusercontent.com/asma512/Vis/main/Automobile_data.csv",
    "format": {
      "type": "csv",
        "parse": {
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        "fuel-type": "string",
        "body-style": "string",
        "curb-weight": "number",
        "num-of-cylinders": "string",
        "engine-size": "number",
        "horsepower": "number",
        "city-mpg": "number",
        "highway-mpg": "number",
        "price": "number"
      }
    }
  },
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    "y": {"field": "body-style", "type": "nominal"}
  }
}
```

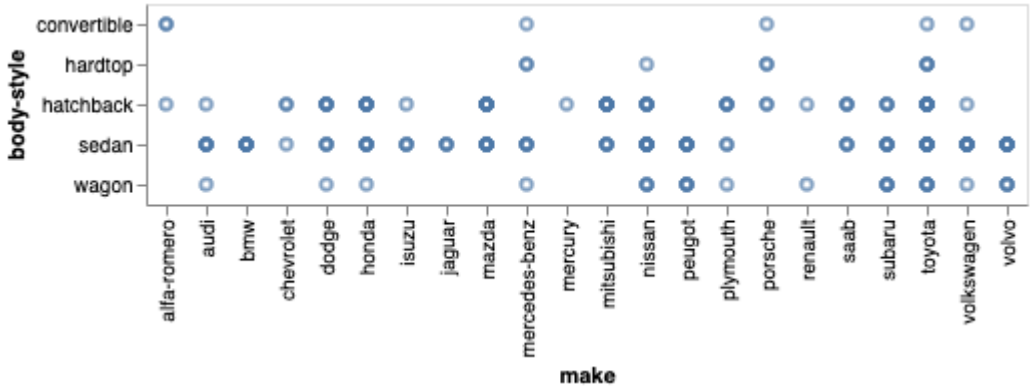

Findings

- Most of the car companies have sedan body style followed by hatchback.
- All the affordable car brands (Chevrolet, Dodge, Honda, Isuzu, Mitsubishi, Plymouth, Subaru, Toyota) have both sedan body style and hatchback.
- Toyota is the only brand that have all body-style of cars.
- Hardtop is the least common body style followed by convertible among the car companies.