

# Lab05 - Covariance and Correlation

Please watch following videos first

<https://www.youtube.com/watch?v=qtaqvPAeEJY&t=19s>

[https://www.youtube.com/watch?v=xZ\\_z8KWkhXE&t=3s](https://www.youtube.com/watch?v=xZ_z8KWkhXE&t=3s)

Create two vectors that's correlation value obviously 1

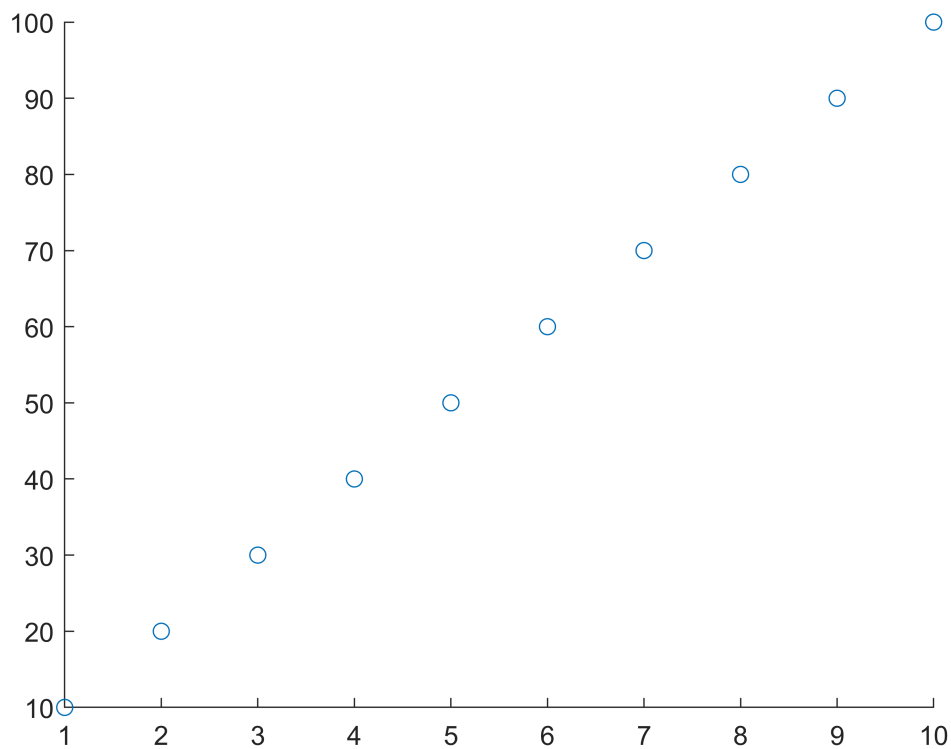
```
x1=1:10
```

```
x1 = 1×10  
    1     2     3     4     5     6     7     8     9    10
```

```
y1=10:10:100
```

```
y1 = 1×10  
    10    20    30    40    50    60    70    80    90   100
```

```
scatter(x1,y1)
```



```
cov1=cov(x1,y1)
```

```
cov1 = 2×2  
    9.1667    91.6667  
    91.6667   916.6667
```

```
corr1=corrcoef(x1,y1)
```

```
corr1 = 2×2
    1    1
    1    1
```

```
corr11=corr(x1',y1')
```

```
corr11 = 1
```

**Create two vectors that's correlation value obviously -1**

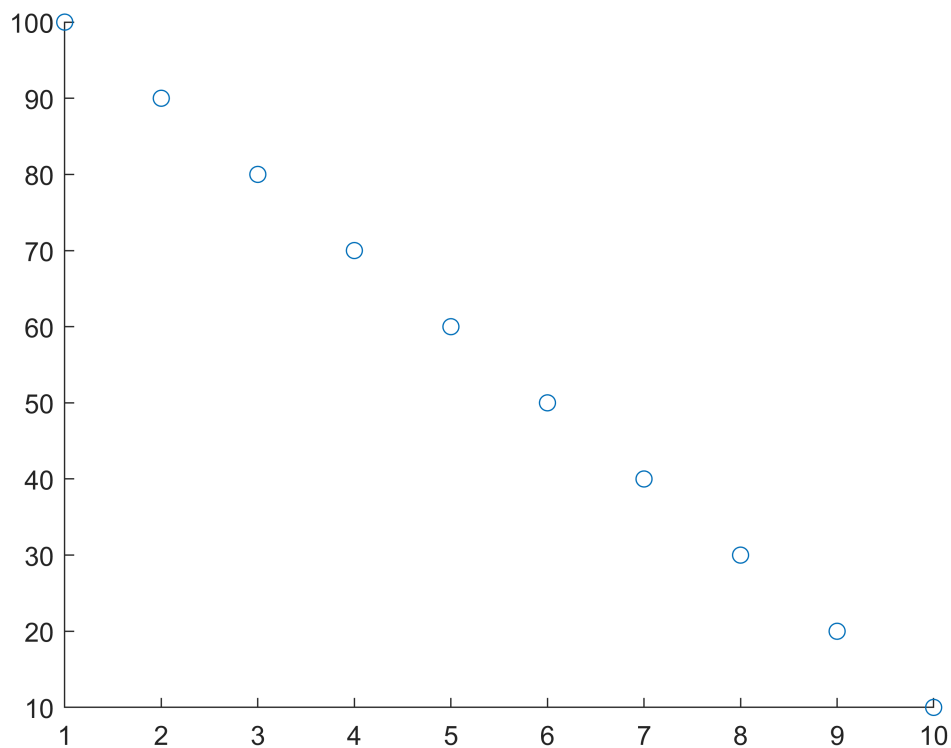
```
x2=1:10
```

```
x2 = 1×10
    1     2     3     4     5     6     7     8     9    10
```

```
y2=100:-10:10
```

```
y2 = 1×10
   100    90    80    70    60    50    40    30    20    10
```

```
scatter(x2,y2)
```



```
cov2=cov(x2,y2)
```

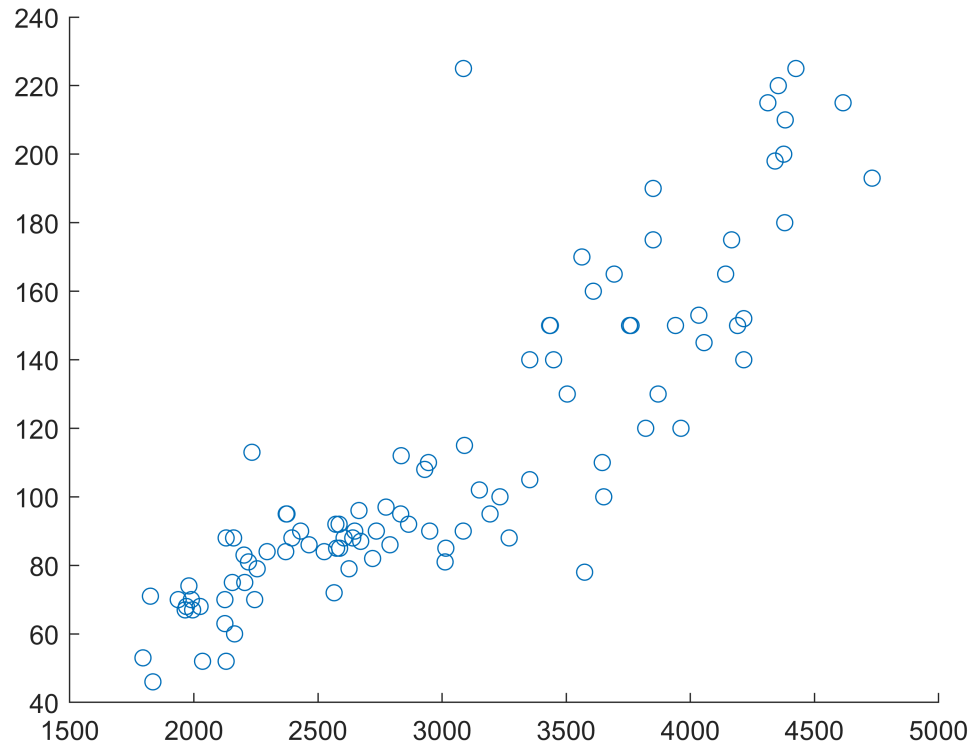
```
cov2 = 2×2
    9.1667  -91.6667
   -91.6667  916.6667
```

```
corr2=corr(x2',y2')
```

```
corr2 = -1
```

Let's look for correlation between Weight and Horsepower

```
clear  
clc  
load carsmall.mat  
scatter(Weight,Horsepower)
```



```
cov3=cov(Weight,Horsepower)
```

```
cov3 = 2×2  
105 ×  
    6.5119    NaN  
    NaN    NaN
```

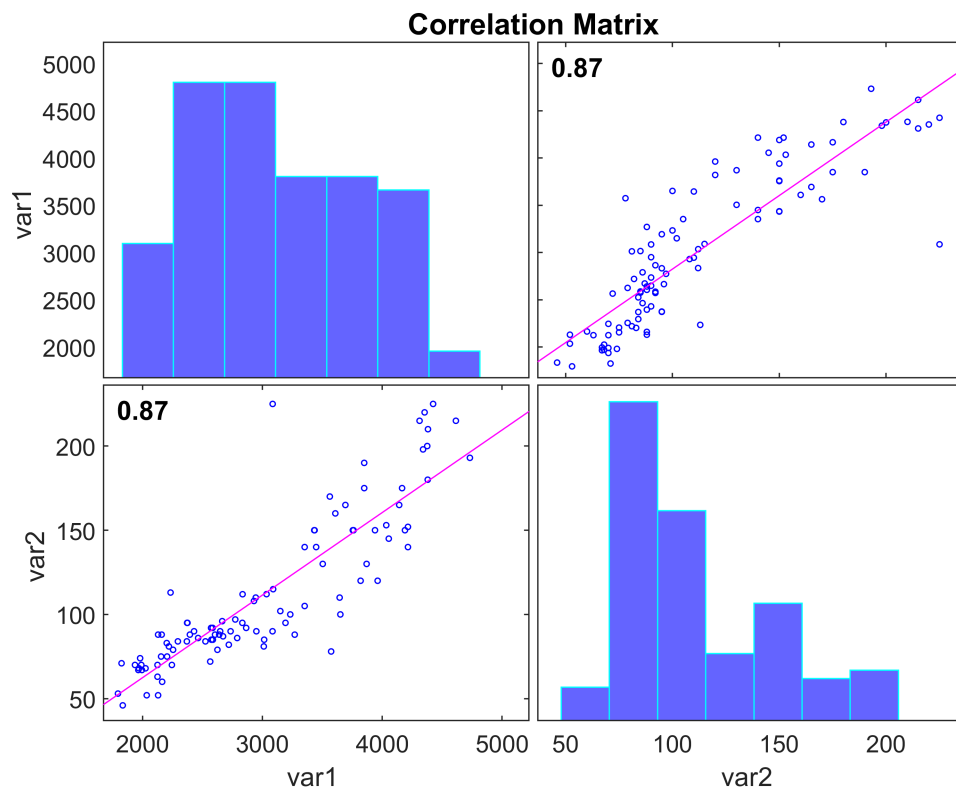
```
Horsepower(isnan(Horsepower))=nanmean(Horsepower);  
cov3=cov(Weight,Horsepower)
```

```
cov3 = 2×2  
105 ×  
    6.5119    0.3192  
    0.3192    0.0205
```

```
corr3=corr(Weight,Horsepower)
```

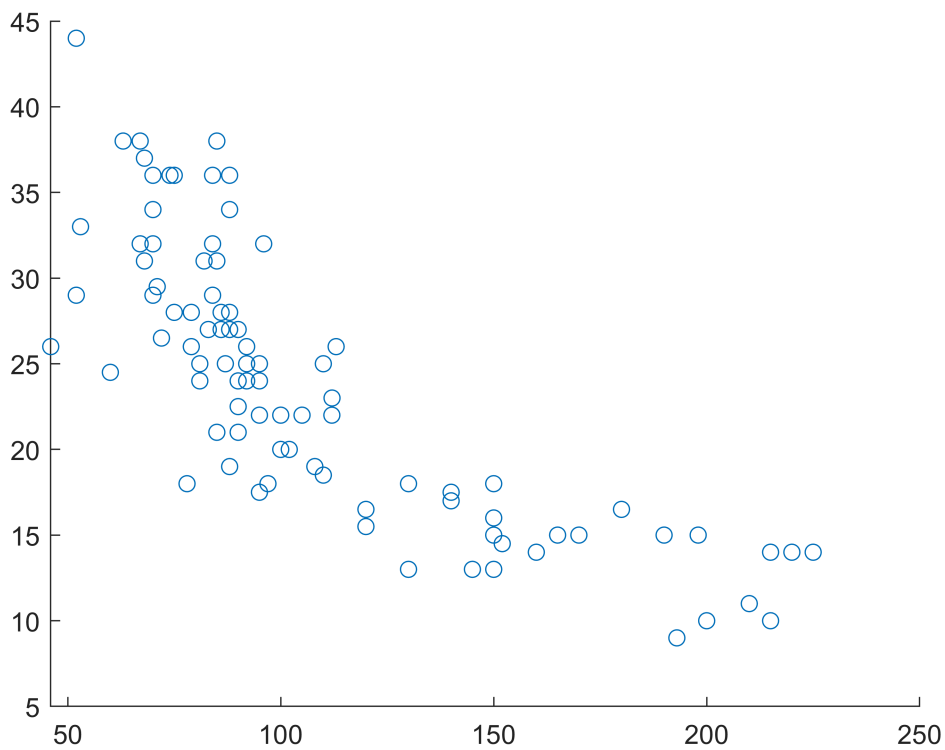
```
corr3 = 0.8733
```

```
corrplot([Weight Horsepower])
```



Let's look for correlation between Weight and Horsepower

```
scatter(Horsepower,MPG)
```



```
cov4=cov(Horsepower,MPG)
```

```
cov4 = 2x2
103 x
    2.0518    NaN
    NaN     NaN
```

```
cov41=nancov(Horsepower,MPG)
```

```
cov41 = 2x2
103 x
    2.0350   -0.2910
   -0.2910    0.0646
```

```
corr4=corr(Horsepower,MPG,"rows","complete")
```

```
corr4 = -0.8028
```

```
corrplot([Horsepower MPG])
```

Correlation Matrix

