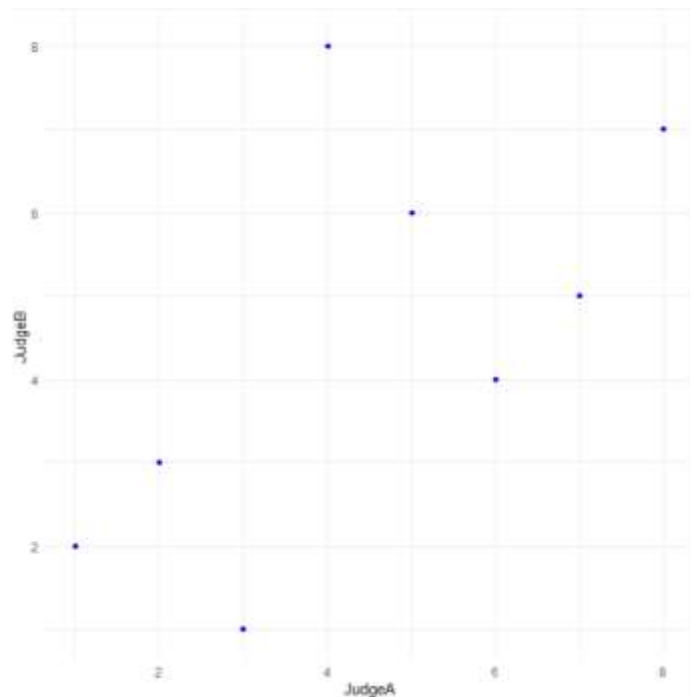


PNS LAB 7

HELI VIJAY NALIAPARA (K068)

```
#q1
dat=mtcars
head(mtcars)
cor(mtcars$mpg,mtcars$cyl)
ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
cor(mtcars$mpg,mtcars$cyl,method="spearman")
JudgeA=c(8,7,6,3,2,1,5,4)
JudgeB=c(7,5,4,1,3,2,6,8)
cor(x,y)
ggplot()+aes(x=JudgeA,y=JudgeB)+geom_point(col="blue")+theme_minimal()
```



```

> #q1
>
> dat=mtcars
> head(mtcars)
      mpg  cyl  disp  hp  drat   wt   qsec vs  am gear carb
Mazda RX4    21.0   6  160 110  3.90 2.620 16.46 0   1    4    4
Mazda RX4 Wag 21.0   6  160 110  3.90 2.875 17.02 0   1    4    4
Datsun 710    22.8   4  108  93  3.85 2.320 18.61 1   1    4    1
Hornet 4 Drive 21.4   6  258 110  3.08 3.215 19.44 1   0    3    1
Hornet Sportabout 18.7   8  360 175  3.15 3.440 17.02 0   0    3    2
Valiant      18.1   6  225 105  2.76 3.460 20.22 1   0    3    1
> cor(mtcars$mpg,mtcars$cyl)
[1] -0.852162
> ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
> cor(mtcars$mpg,mtcars$cyl,method="spearman")
[1] -0.9108013
> JudgeA=c(8,7,6,3,2,1,5,4)
> JudgeB=c(7,5,4,1,3,2,6,8)
> cor(x,y)
[1] 0.6190476
> ggplot()+aes(x=JudgeA,y=JudgeB)+geom_point(col="blue")+theme_minimal()

```

Q1 Judge A 8 7 6 3 2 1 5 4
 Judge B 7 5 4 1 3 2 6 8

Finding r using actual mean method

$$\bar{x} = (8+7+6+3+2+1+5+4)/8 = 4.5$$

$$\bar{y} = (7+5+4+1+3+2+6+8)/8 = 4.5$$

X	Y	$x - \bar{x}$	$y - \bar{y}$	x^2	y^2	xy
8	7	3.5	2.5	12.25	6.25	8.75
7	5	2.5	0.5	6.25	0.25	1.25
6	4	1.5	-0.5	2.25	0.25	-0.75
3	1	-1.5	-3.5	2.25	12.25	-5.25
2	3	-2.5	-1.5	6.25	2.25	-3.75
1	2	-3.5	-2.5	12.25	6.25	-8.75
5	6	0.5	1.5	0.25	2.25	0.75
4	8	-0.5	3.5	0.25	12.25	-1.75

$\sum x^2 = 42$ $\sum y^2 = 42$ $\sum xy = 26$

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} = \frac{26}{\sqrt{42 \times 42}} = \frac{26}{42} = 0.6190476$$

#q2

```
dat=mtcars
```

```
head(mtcars)
```

```
cor(mtcars$mpg,mtcars$cyl)
```

```
ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
```

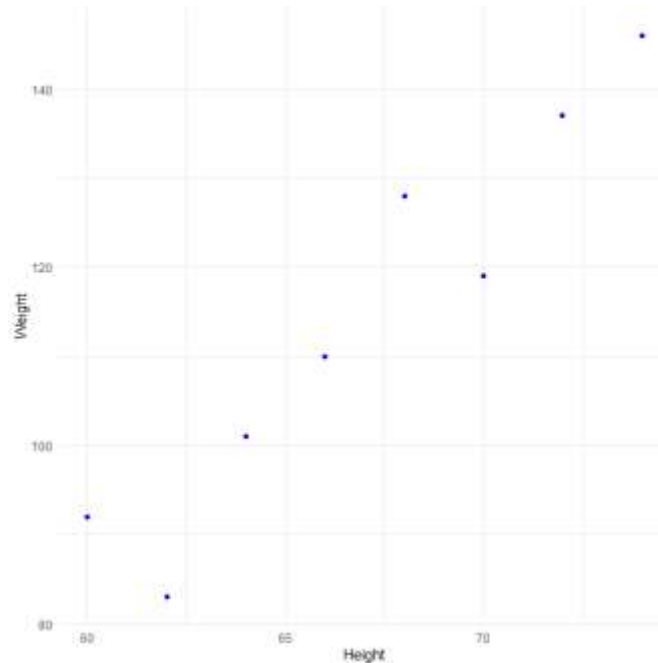
```
cor(mtcars$mpg,mtcars$cyl,method="spearman")
```

```
Height =c(60,62,64,66,68,70,72,74)
```

```
Weight =c(92,83,101,110,128,119,137,146)
```

```
cor(x,y, method = "spearman")
```

```
ggplot()+aes(x=Height,y=Weight)+geom_point(col="blue")+theme_minimal()
```



```
> #q2
>
> dat=mtcars
> head(mtcars)
      mpg  cyl  disp  hp  drat    wt   qsec  vs  am  gear  carb
Mazda RX4     21.0   6  160  110  3.90  2.620  16.46   0   1    4    4
Mazda RX4 Wag  21.0   6  160  110  3.90  2.875  17.02   0   1    4    4
Datsun 710     22.8   4  108   93  3.85  2.320  18.61   1   1    4    1
Hornet 4 Drive  21.4   6  258  110  3.08  3.215  19.44   1   0    3    1
Hornet Sportabout 18.7   8  360  175  3.15  3.440  17.02   0   0    3    2
Valiant        18.1   6  225  105  2.76  3.460  20.22   1   0    3    1
> cor(mtcars$mpg,mtcars$cyl)
[1] -0.852162
> ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
> cor(mtcars$mpg,mtcars$cyl,method="spearman")
[1] -0.9108013
> Height =c(60,62,64,66,68,70,72,74)
> Weight =c(92,83,101,110,128,119,137,146)
> cor(x,y, method = "spearman")
[1] 0.6190476
> ggplot()+aes(x=Height,y=Weight)+geom_point(col="blue")+theme_minimal()
```

Q2: Height: 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 → x
 Weight: 92 | 83 | 101 | 110 | 128 | 119 | 137 | 146 → y

$\bar{x} = 67$
 $\bar{y} = 114.5$

X	X - \bar{X}	Y	Y - \bar{Y}	X ²	Y ²	XY
60	-7	92	-22.5	49	506.25	157.5
62	-5	83	-31.5	25	992.25	157.5
64	-3	101	-13.5	9	182.25	40.5
66	-1	110	-4.5	1	20.25	4.5
68	1	128	13.5	1	182.25	13.5
70	3	119	4.5	9	20.25	13.5
72	5	137	22.5	25	506.25	112.5
74	7	146	31.5	49	942.25	220.5
$\sum X^2 = 168$ $\sum Y^2 = 3402$ $\sum XY = 720$						
$r = \frac{\sum XY}{\sqrt{\sum X^2 \sum Y^2}} = \frac{720}{\sqrt{168 \times 3402}} = 0.952388$						

#q3

```
#import ISLR and dplyr
```

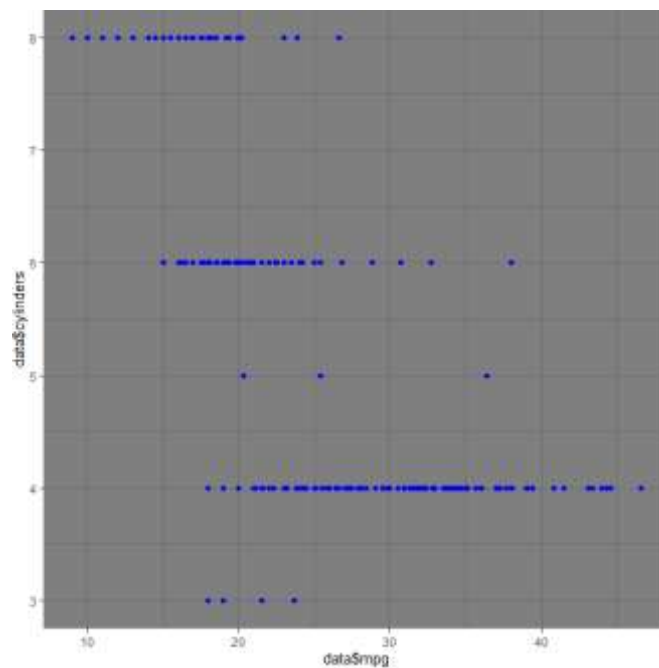
```
data = Auto
```

```
data2 = select_if(data,is.numeric)
```

```
print(data2)
```

```
cor(data$mpg,data$cylinders)
```

```
ggplot()+aes(data$mpg,data$cylinders)+geom_point(col = "blue")+theme_dark()
```



```

116 15      8      350.0      145  4082      13.0  73      1
117 16      8      400.0      230  4278       9.5  73      1
118 29      4       68.0       49  1867      19.5  73      2
119 24      4      116.0       75  2158      15.5  73      2
120 20      4      114.0       91  2582      14.0  73      2
121 19      4      121.0      112  2868      15.5  73      2
122 15      8      318.0      150  3399      11.0  73      1
123 24      4      121.0      110  2660      14.0  73      2
124 20      6      156.0      122  2807      13.5  73      3
125 11      8      350.0      180  3664      11.0  73      1
126 20      6      198.0       95  3102      16.5  74      1
[ reached 'max' / getOption("max.print") -- omitted 267 rows ]
> cor(data$mpg,data$cylinders)
[1] -0.7776175
> ggplot()+aes(data$mpg,data$cylinders)+geom_point(col = "blue")+theme_dark()

```

#q3

#import ISLR and dplyr

data = Auto

data2 = select_if(data,is.numeric)

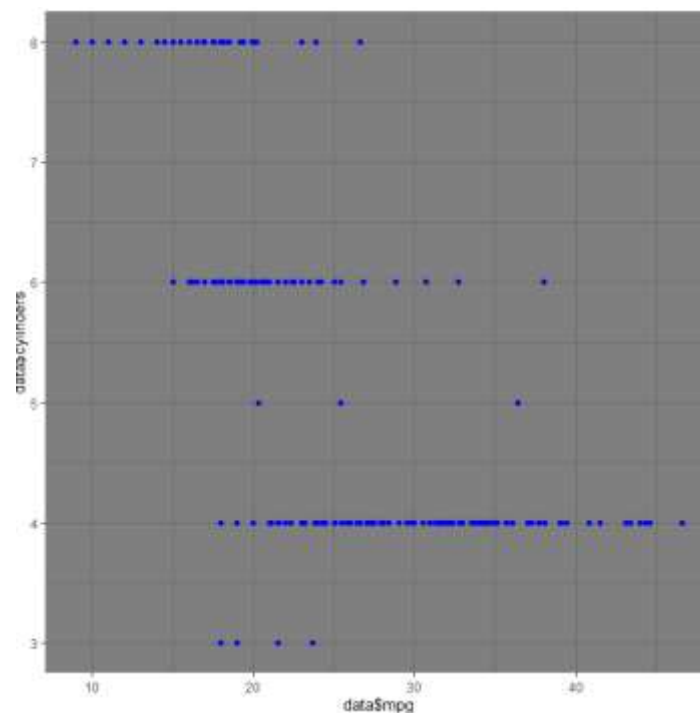
print(data2)

cor(data\$mpg,data\$cylinders)

ggplot()+aes(data\$mpg,data\$cylinders)+geom_point(col = "blue")+theme_dark()

q4

cor(data2)




```

> cor(data$mpg,data$cylinders)
[1] -0.7776175
> ggplot()+aes(data$mpg,data$cylinders)+geom_point(col = "blue")+theme_dark()
>
> # q4
> cor(data2)

```

	mpg	cylinders	displacement	horsepower	weight	acceleration	year	origin
mpg	1.0000000	-0.7776175	-0.8051269	-0.7784268	-0.8322442	0.4233285	0.5805410	0.5652088
cylinders	-0.7776175	1.0000000	0.9508233	0.8429834	0.8975273	-0.5046834	-0.3456474	-0.5689316
displacement	-0.8051269	0.9508233	1.0000000	0.8972570	0.9329944	-0.5438005	-0.3698552	-0.6145351
horsepower	-0.7784268	0.8429834	0.8972570	1.0000000	0.8645377	-0.6891955	-0.4163615	-0.4551715
weight	-0.8322442	0.8975273	0.9329944	0.8645377	1.0000000	-0.4168392	-0.3091199	-0.5850054
acceleration	0.4233285	-0.5046834	-0.5438005	-0.6891955	-0.4168392	1.0000000	0.2903161	0.2127458
year	0.5805410	-0.3456474	-0.3698552	-0.4163615	-0.3091199	0.2903161	1.0000000	0.1815277
origin	0.5652088	-0.5689316	-0.6145351	-0.4551715	-0.5850054	0.2127458	0.1815277	1.0000000

```

> |

```

#q5

```
dat=mtcars
```

```
head(mtcars)
```

```
cor(mtcars$mpg,mtcars$cyl)
```

```
ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
```

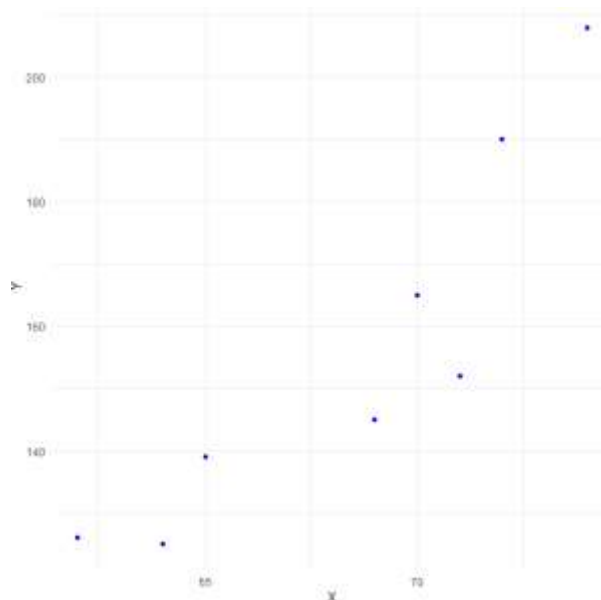
```
cor(mtcars$mpg,mtcars$cyl,method="spearman")
```

```
X =c(62,64,65,69,70,71,72,74)
```

```
Y =c(126,125,139,145,165,152,190,208)
```

```
cor(x,y)
```

```
ggplot()+aes(x=X,y=Y)+geom_point(col="blue")+theme_minimal()
```



```

> #q5
>
> dat=mtcars
> head(mtcars)
      mpg  cyl  disp  hp  drat   wt   qsec vs  am  gear  carb
Mazda RX4     21.0   6  160  110  3.90  2.620  16.46  0   1    4    4
Mazda RX4 Wag  21.0   6  160  110  3.90  2.875  17.02  0   1    4    4
Datsun 710     22.8   4  108   93  3.85  2.320  18.61  1   1    4    1
Hornet 4 Drive  21.4   6  258  110  3.08  3.215  19.44  1   0    3    1
Hornet Sportabout 18.7   8  360  175  3.15  3.440  17.02  0   0    3    2
Valiant        18.1   6  225  105  2.76  3.460  20.22  1   0    3    1
> cor(mtcars$mpg,mtcars$cyl)
[1] -0.852162
> ggplot(dat)+aes(x=mpg,y=cyl)+geom_point(col="blue")+theme_minimal()
> cor(mtcars$mpg,mtcars$cyl,method="spearman")
[1] -0.9108013
> X =c(62,64,65,69,70,71,72,74)
> Y =c(126,125,139,145,165,152,190,208)
> cor(X,Y)
[1] 0.6190476
> ggplot()+aes(x=X,y=Y)+geom_point(col="blue")+theme_minimal()
>

```

Q5:

	X	Y
x:	62	126
y:	125	134
	64	145
	65	165
	70	152
	71	180
	72	208
	74	

$$\bar{x} = 68.375$$

$$\bar{y} = 155$$

X	X - \bar{X}	Y	Y - \bar{Y}	X ²	Y ²	XY
62	-6.375	126	-29	40.64	841	184.875
64	-4.375	125	-30	19.14	900	131.25
65	-3.375	134	-16	11.39	256	54
64	0.625	145	-10	0.39	100	-6.25
70	1.625	165	10	2.64	100	16.25
71	2.625	152	-3	6.89	9	-7.875
72	3.625	180	25	13.14	625	90.625
74	5.625	208	53	31.64	2809	81.25
$\sum X^2 = 125.87$				$\sum Y^2 = 5640$		$\sum XY = 761$
$r = \frac{761}{\sqrt{125.87 \times 5640}}$				$= 0.9032$		

#q6

```
potion_study = c(3,15,6,8,4,2,10)
```

```
potion_exam = c(75,95,65,70,85,80,65)
```

```
defense_study = c(4,12,9,6,2,3,10)
```

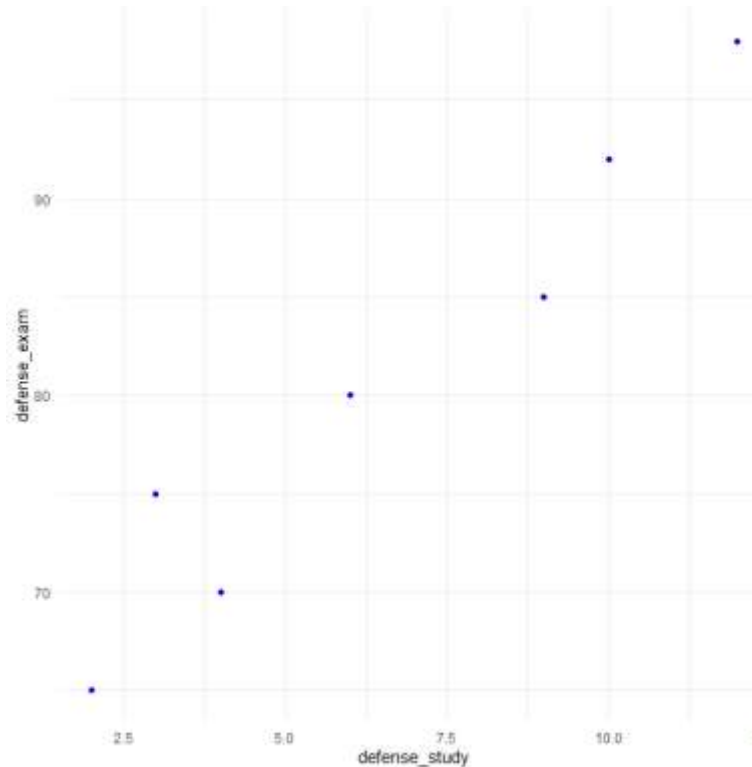
```
defense_exam = c(70,98,85,80,65,75,92)
```

```
cor(potion_study,potion_exam)
```

```
ggplot()+aes(potion_study,potion_exam)+theme_minimal()
```

```
cor(defense_study,defense_exam)
```

```
ggplot()+aes(defense_study,defense_exam)+geom_point(col = "blue")+theme_minimal()
```



```
> #q6
>
> potion_study = c(3,15,6,8,4,2,10)
> potion_exam = c(75,95,65,70,85,80,65)
> defense_study = c(4,12,9,6,2,3,10)
> defense_exam = c(70,98,85,80,65,75,92)
> cor(potion_study,potion_exam)
[1] 0.2686677
> ggplot()+aes(potion_study,potion_exam)+theme_minimal()
> cor(defense_study,defense_exam)
[1] 0.9697606
> ggplot()+aes(defense_study,defense_exam)+geom_point(col = "blue")+theme_minimal()
> |
```