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LAB WEEK – 5 ASSESSMENT

1) AIM : To find the regression coefficient and the regression lines for the given x and y

SYNTAX :

num=sum((x-mean_x)*(y-mean_y))

den1=(sum((x-mean_x)^2))

den2=(sum((y-mean_y)^2))

byx=num/den1

bxy=num/den2

r=sqrt(byx*bxy)

CODE :

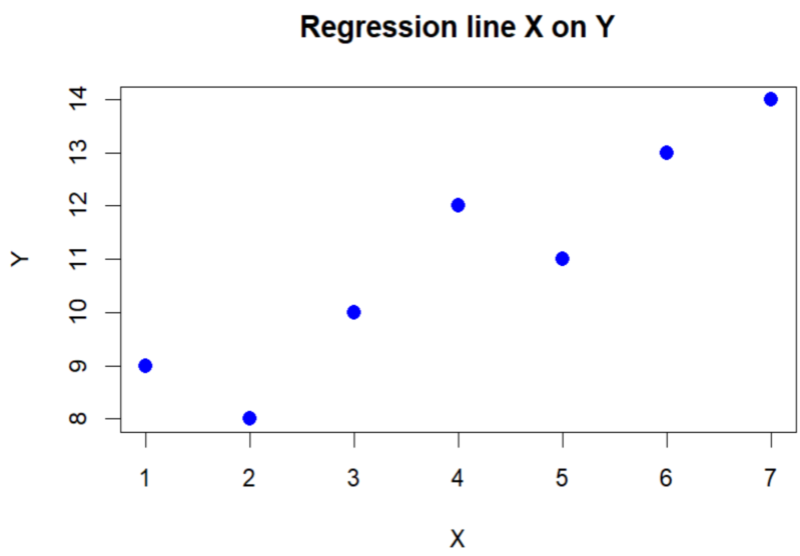
```
x=c(1,2,3,4,5,6,7)
y=c(9,8,10,12,11,13,14)
mean_x=mean(x)
mean_y=mean(y)
num=sum((x-mean_x)*(y-mean_y))
den1=(sum((x-mean_x)^2))
den2=(sum((y-mean_y)^2))
byx=num/den1
bxy=num/den2
r=sqrt(byx*bxy)
sprintf("Regression coefficient is %.3f",r)
sprintf("Regression line of X on Y => X - %d = %.3f(Y - %d)",mean_x,bxy,mean_y)
sprintf("Regression line of Y on X => Y - %d = %.3f(X - %d)",mean_y,byx,mean_x)

```

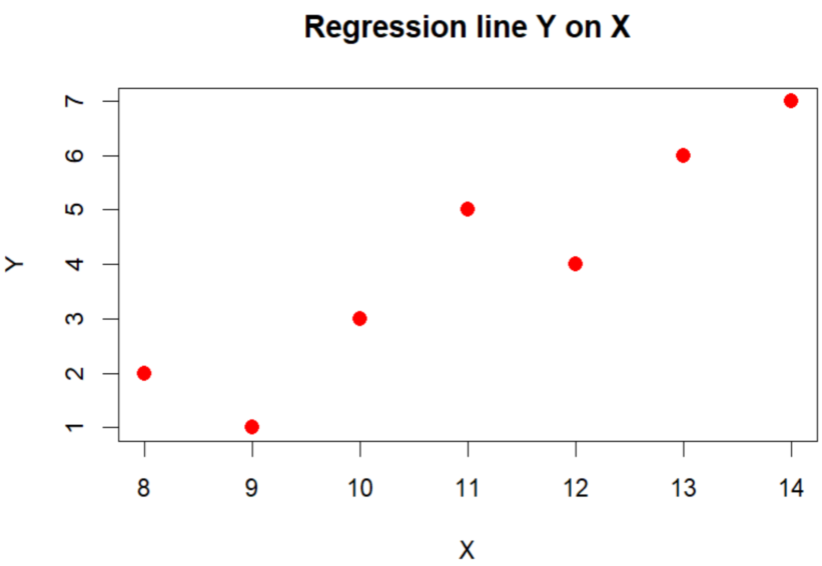
OUTPUT :

```
> x=c(1,2,3,4,5,6,7)
> y=c(9,8,10,12,11,13,14)
> mean_x=mean(x)
> mean_y=mean(y)
> num=sum((x-mean_x)*(y-mean_y))
> den1=(sum((x-mean_x)^2))
> den2=(sum((y-mean_y)^2))
> byx=num/den1
> bxy=num/den2
> r=sqrt(byx*bxy)
> sprintf("Regression coefficient is %.3f",r)
[1] "Regression coefficient is 0.929"
> sprintf("Regression line of X on Y => X - %d = %.3f(Y - %d)",mean_x,bxy,mean_y)
[1] "Regression line of X on Y => X - 4 = 0.929(Y - 11)"
> sprintf("Regression line of Y on X => Y - %d = %.3f(X - %d)",mean_y,byx,mean_x)
[1] "Regression line of Y on X => Y - 11 = 0.929(X - 4)"
>
```

Values	
bxy	0.928571428571429
byx	0.928571428571429
den1	28
den2	28
mean_x	4
mean_y	11
num	26
r	0.928571428571429
x	num [1:7] 1 2 3 4 5 6 7
y	num [1:7] 9 8 10 12 11 13 14

GRAPH :





INFERENCE : The value of "r" is a positive regression coefficient

2) AIM : To find the regression lines, compute value for the given X and visualize it

SYNTAX :

model=lm(y~x)

a=data.frame(x=55)

ans=predict(model,a)

CODE :

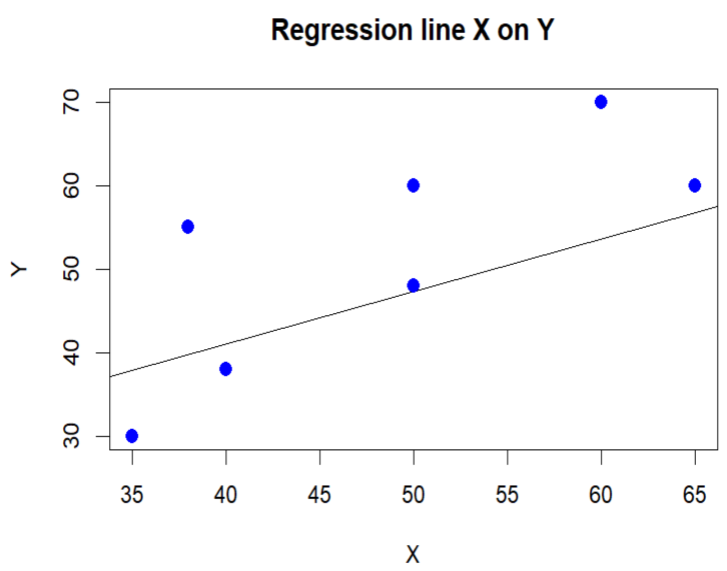
```
x=c(40,50,38,60,65,50,35)
y=c(38,60,55,70,60,48,30)
mean_x=mean(x)
mean_y=mean(y)
num=sum((x-mean_x)*(y-mean_y))
den1=(sum((x-mean_x)^2))
den2=(sum((y-mean_y)^2))
byx=num/den1
bxy=num/den2
model=lm(y~x)
a=data.frame(x=55)
ans=predict(model,a)
sprintf("When X=55, Y is equal to %.3f",ans)
sprintf("Regression line of X on Y => X - %.3f = %.3f(Y - %.3f)",mean_x,bxy,mean_y)
sprintf("Regression line of Y on X => Y - %.3f = %.3f(X - %.3f)",mean_y,byx,mean_x)
plot(y, x, col = "red", main = "Regression line Y on X", abline(lm(y~x)),
     cex = 1.3, pch = 16, xlab = "X", ylab = "Y")
plot(x, y, col = "blue", main = "Regression line X on Y", abline(lm(x~y)),
     cex = 1.3, pch = 16, xlab = "X", ylab = "Y")
```

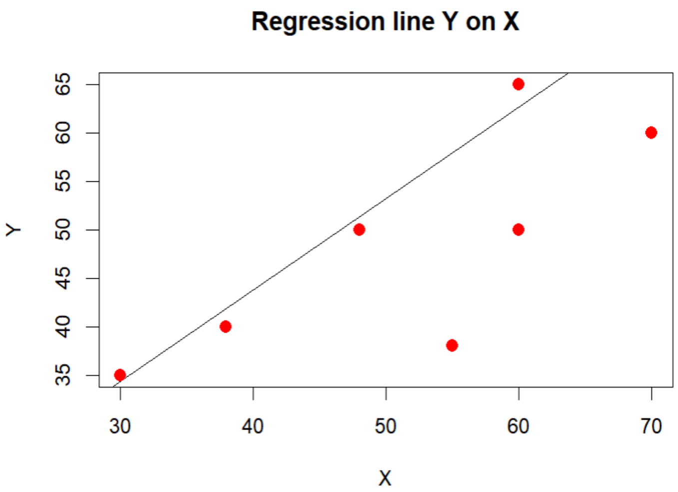
OUTPUT :

```
> x=c(40,50,38,60,65,50,35)
> y=c(38,60,55,70,60,48,30)
> mean_x=mean(x)
> mean_y=mean(y)
> num=sum((x-mean_x)*(y-mean_y))
> den1=(sum((x-mean_x)^2))
> den2=(sum((y-mean_y)^2))
> byx=num/den1
> bxy=num/den2
> model=lm(y~x)
> a=data.frame(x=55)
> ans=predict(model,a)
> sprintf("When X=55, Y is equal to %.3f",ans)
[1] "When X=55, Y is equal to 57.899"
> sprintf("Regression line of X on Y => X - %.3f = %.3f(Y - %.3f)",mean_x,bxy,mean_y)
[1] "Regression line of X on Y => X - 48.286 = 0.631(Y - 51.571)"
> sprintf("Regression line of Y on X => Y - %.3f = %.3f(X - %.3f)",mean_y,byx,mean_x)
[1] "Regression line of Y on X => Y - 51.571 = 0.942(X - 48.286)"
> plot(y, x, col = "red", main = "Regression line Y on X", abline(lm(y~x)), cex = 1.3, pch =
 16, xlab = "X", ylab = "Y")
> plot(x, y, col = "blue", main = "Regression line X on Y", abline(lm(x~y)), cex = 1.3, pch
 = 16, xlab = "X", ylab = "Y")
```

Values	
ans	Named num 57.9
bxy	0.630655129789864
byx	0.942371629109716
den1	773.428571428571
den2	1155.71428571429
mean_x	48.2857142857143
mean_y	51.5714285714286
num	728.857142857143
x	num [1:7] 40 50 38 60 65 50 35
y	num [1:7] 38 60 55 70 60 48 30

GRAPH :





3) AIM : To frame the regression equation using given data and find the value of X for the given Y

SYNTAX :

byx=(r*sd_y)/sd_x   bxy=(r*sd_x)/sd_y

x=mean_x+bxy*(y-mean_y)

CODE :

```
mean_x=40
mean_y=6
sd_x=10
sd_y=1.5
r=0.9
byx=(r*sd_y)/sd_x
bxy=(r*sd_x)/sd_y
y=10
x=mean_x+bxy*(y-mean_y)
sprintf("The likely sales for a proposed
        advertisement expenditure of Rs. 10 crores is %d",x)
```

OUTPUT :

```
> mean_x=40
> mean_y=6
> sd_x=10
> sd_y=1.5
> r=0.9
> byx=(r*sd_y)/sd_x
> bxy=(r*sd_x)/sd_y
> y=10
> x=mean_x+bxy*(y-mean_y)
> sprintf("The likely sales for a proposed advertisement expenditure of Rs. 10 crores is %
d",x)
[1] "The likely sales for a proposed advertisement expenditure of Rs. 10 crores is 64"
```

Values	
bxy	6
byx	0.135
mean_x	40
mean_y	6
r	0.9
r1	0.9
sd_x	10
sd_y	1.5
x	64
y	10

4) AIM : To find the mean, regression coefficient, regression equations and the value y for the given x

SYNTAX :

```
mean_x=mean(x)

mean_y=mean(y)

num=sum((x-mean_x)*(y-mean_y))

den1=(sum((x-mean_x)^2))

den2=(sum((y-mean_y)^2))

byx=num/den1

bxy=num/den2

r=sqrt(bxy*byx)

model=lm(y~x)

a=data.frame(x=4)

ans=predict(model,a)

plot(y, x, col = "red", main = "Regression line Y on X", abline(lm(y~x)),

    cex = 1.3, pch = 16, xlab = "X", ylab = "Y")

plot(x, y, col = "blue", main = "Regression line X on Y", abline(lm(x~y)),
```

```
cex = 1.3, pch = 16, xlab = "X", ylab = "Y")
```

CODE :

```
x=c(1,3,5,7,9)
y=c(15,18,21,23,22)
mean_x=mean(x)
mean_y=mean(y)
num=sum((x-mean_x)*(y-mean_y))
den1=(sum((x-mean_x)^2))
den2=(sum((y-mean_y)^2))
byx=num/den1
bxy=num/den2
r=sqrt(bxy*byx)
model=lm(y~x)
a=data.frame(x=4)
ans=predict(model,a)
sprintf("Mean of X is %d and Y is %.3f",mean_x,mean_y)
sprintf("Regression Coefficient is %.3f",r)
sprintf("Regression line of X on Y => X - %d = %.2f(Y - %.1f)",mean_x,bxy,mean_y)
sprintf("Regression line of Y on X => Y - %.1f = %.2f(X - %d)",mean_y,byx,mean_x)
sprintf("The maintenance cost for a 4-year-old car is %.3f",ans)
plot(y, x, col = "red", main = "Regression line Y on X", abline(lm(y~x)),
     cex = 1.3, pch = 16, xlab = "X", ylab = "Y")
plot(x, y, col = "blue", main = "Regression line X on Y", abline(lm(x~y)),
     cex = 1.3, pch = 16, xlab = "X", ylab = "Y")
```

OUTPUT :

```
> x=c(1,3,5,7,9)
> y=c(15,18,21,23,22)
> mean_x=mean(x)
> mean_y=mean(y)
> num=sum((x-mean_x)*(y-mean_y))
> den1=(sum((x-mean_x)^2))
> den2=(sum((y-mean_y)^2))
> byx=num/den1
> bxy=num/den2
> r=sqrt(bxy*byx)
> model=lm(y~x)
> a=data.frame(x=4)
> ans=predict(model,a)
> sprintf("Mean of X is %d and Y is %.3f",mean_x,mean_y)
[1] "Mean of X is 5 and Y is 19.800"
> sprintf("Regression Coefficient is %.3f",r)
[1] "Regression Coefficient is 0.918"
> sprintf("Regression line of X on Y => X - %d = %.2f(Y - %.1f)",mean_x,bxy,mean_y)
[1] "Regression line of X on Y => X - 5 = 0.89(Y - 19.8)"
> sprintf("Regression line of Y on X => Y - %.1f = %.2f(X - %d)",mean_y,byx,mean_x)
[1] "Regression line of Y on X => Y - 19.8 = 0.95(X - 5)"
> sprintf("The maintenance cost for a 4-year-old car is %.3f",ans)
[1] "The maintenance cost for a 4-year-old car is 18.850"
>
```

Values	
ans	Named num 18.8
bxy	0.88785046728972
byx	0.95
den1	40
den2	42.8
mean_x	5
mean_y	19.8
num	38
r	0.91839966459338
x	num [1:5] 1 3 5 7 9
y	num [1:5] 15 18 21 23 22

GRAPH :