



# ADVANCED PHARMACEUTICAL BIOSTATISTICS

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**PhD Pharmaceutics**

Lect 4



# Regression Correlation



Regression Analysis measures the nature and extent of the relationship between two or **more variables**, thus enables us to make predictions.

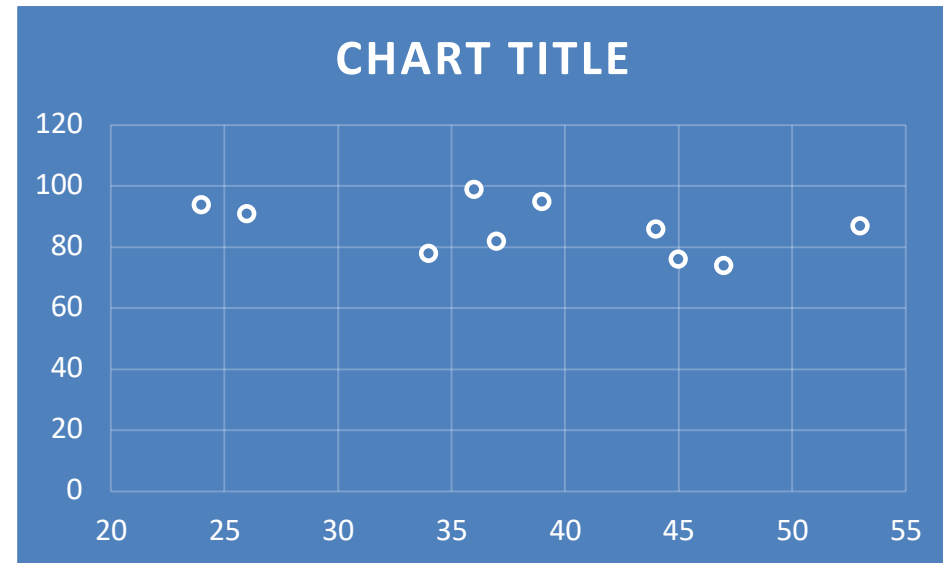
Regression is the measure of the average relationship between two or more variables.

## UTILITY OF REGRESSION

- o Degree & Nature of relationship
- o Estimation of relationship
- o Prediction
- o Useful in Economic & Business Research



Pt n	Age	PaO2(mmHg)
1	47	74
2	26	91
3	34	78
4	36	99
5	24	94
6	45	76
7	39	95
8	37	82
9	44	86
10	53	87
Sum	385	862
mean	38.5	86.2





# Straight Line equation

$$Y = a + bX$$



Intercept

Slope

$$b = \frac{\sum xy}{\sum x^2}$$

-0.4224

102.461

$$a = Y - bX$$

Y at 30 89.790

Y at 50 81.3426

Age	PaO2(mm Hg)	X <sup>2</sup>	Y <sup>2</sup>	X*Y
47	74	2209	5476	3478
26	91	676	8281	2366
34	78	1156	6084	2652
36	99	1296	9801	3564
24	94	576	8836	2256
45	76	2025	5776	3420
39	95	1521	9025	3705
37	82	1369	6724	3034
44	86	1936	7396	3784
53	87	2809	7569	4611
385	862	15573	74968	32870
38.5	86.2			

$$\sum X^2 = \sum (X)^2 - \frac{(\sum X)^2}{n}$$

750.5

$$\sum Y^2 = \sum (Y)^2 - \frac{(\sum Y)^2}{n}$$

663.6

$$\sum XY = \sum XY - \frac{\sum X \sum Y}{n}$$

-317

$$b = \frac{n \sum XY - [(\sum X)(\sum Y)]}{n \sum X^2 - (\sum X)^2}$$



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$$\sum X^2 = \sum (X)^2 - \frac{(\sum X)^2}{n}$$

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$$\sum Y^2 = \sum (Y)^2 - \frac{(\sum y)^2}{n}$$

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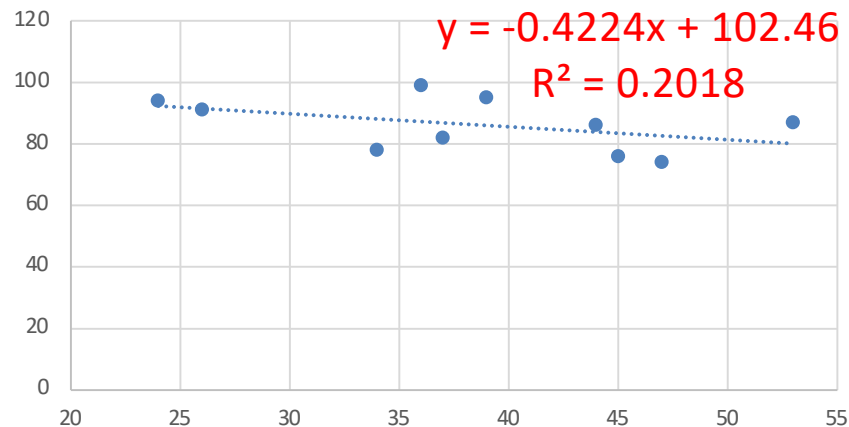
$$\sum XY = \sum XY - \frac{\sum X \sum y}{n}$$

-317

$$r = \frac{\sum xy}{\sqrt{\sum X^2 \sum y^2}}$$

-0.4491907

R<sup>2</sup>=0.2018





# Straight Line equation

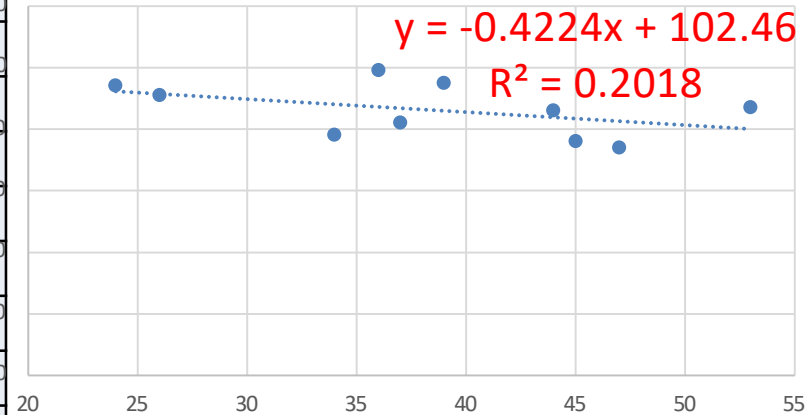
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Intercept

Slope



By Excel

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.44919067
R Square	0.20177226
Adjusted R Square	0.10199379
Standard Error	8.13713656
Observations	10

ANOVA									
	df	SS	MS	F	Significance F				
Regression	1	133.896069	133.896069	2.02220239	0.192808549				
Residual	8	529.703931	66.2129913						
Total	9	663.6							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	102.461825	11.7214786	8.74137378	2.295E-05	75.4320474	129.491604	75.4320474	129.491604	
X Variable 1	-0.4223851	0.29702722	-1.4220416	0.19280855	-1.107331083	0.26256093	-1.1073311	0.26256093	

