

$$\text{Correlation} = \frac{\text{Cov}(x, y)}{\sigma_x \cdot \sigma_y}$$

Q. 17/18/19

Covariance and correlation

$$\text{Covariance} = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

$$\text{Corr} = \frac{\text{Cov}(x, y)}{\sigma_x \cdot \sigma_y}$$

Adv Spending	Sales
10	100
20	150
15	120
25	180
30	200
35	220
40	240
45	260
50	280
55	300

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Example of ADV

$x = \text{ADV}$        $y = \text{Sales}$

Mean of ADV = 32.5 =  $\bar{x}$

Mean of sales = 105 =  $\bar{y}$

$x_i - \bar{x}$	$y_i - \bar{y}$	$(x_i - \bar{x})(y_i - \bar{y})$
-22.5	-105	2362.5
-12.5	-55	687.5
-17.5	-85	1487.5
-7.5	-25	187.5
-2.5	-5	12.5
2.5	15	37.5
7.5	35	262.5
12.5	55	687.5
17.5	75	1312.5
22.5	95	2137.5
		9115

$$\text{Covariance} = \frac{9115}{10} = 911.5$$

$$\sigma_x = 15.1382$$

$$\sigma_y = 67.536$$

$$\text{Correlation} = \frac{911.5}{15.1382 \times 67.536}$$

$$= 0.9906$$