PORTFOLIO MANAGEMENT

CLASS - 3

CASE STUDY 3

	X	Y
E(R)	19%	23%
σ	14%	18%

1) $E(R) = \frac{19+23}{2} = 21\%$ (b)

2) σ_p of 60% X & 40% Y

$= \sqrt{(.6 \times 14)^2 + (.4 \times 18)^2 + 2 \times .6 \times .4 \times .16 \times 14 \times 18}$

$= \sqrt{70.56 + 51.84 + 19.35}$

(iv)

$= \sqrt{141.75}$

$= 11.90\%$ (c)

3) σ_p of (i)

$(.5 \times 14)^2 + .5 \times$

$= 12.25\%$

σ_p of iii) = 12.07%

4) σ_p of v) = 13.39%

b → Portfolio IV

Q4. ∵ Y ka return iii portfolio me jyada hai us portfolio ~~ka rata~~ uska weight jyada hai → choose that

∴ Portfolio iii (a) → Do not calculate.

Formula & Calculation of Correlation

$$\boxed{r = \frac{\text{cov}(x,y)}{\sigma x\, \sigma y}}$$

$$\sigma p = \sqrt{w x^2 \sigma x^2 + w y^2 \sigma y^2 + 2 w_x w_y \underbrace{\text{Cov}(x,y)}_{r\sigma x \sigma y}}$$

Covariance $(x,y) = r \sigma x\, \sigma y$

joint ← Co, deviation ← variance

$(x-\bar{x})(y-\bar{y})$ → Time

replace with $\bar{x}$

Past Data
⇓
$$\frac{\Sigma (x-\bar{x})(y-\bar{y})}{n}$$

Future data
⇓
$$\Sigma P (x-\bar{x})(y-\bar{y})$$

Correlation: −1 ←——— 0 ———→ (+1)

−1: सबसे Best

+1: सबसे खराब

−1 not possible in real life.

Past Data :-

Yrs	x	y	$x-\bar{x}$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
					Σ	Σ	Σ

$\frac{\Sigma}{n} \rightarrow \sigma_x$ $\quad \frac{\Sigma}{n} \rightarrow \sigma_y$ $\quad \frac{\Sigma}{n} \rightarrow cov(x,y)$

Exm & **CASE STUDY - 2**

Yrs	x	y	$(x-\bar{x})$	$y-\bar{y}$	$(x-\bar{x})^2$	$(y-\bar{y})^2$	$(x-\bar{x})(y-\bar{y})$
1	15	24	−0.3	4.5	0.09	20.25	−1.35
2	10	20	−5.3	.5	28.09	0.25	−2.65
3	12	18	−3.3	−1.5	10.89	2.25	4.95
4	8	14	−7.3	−5.5	53.29	30.25	40.15
5	18	22	2.7	2.5	7.29	6.25	6.75
6	16	26	0.7	6.5	0.49	42.25	4.55
7	20	12	4.7	−7.5	22.09	56.25	−35.25
8	24	28	8.7	8.5	75.69	72.25	73.95
9	16	16	0.7	−3.5	0.49	12.25	−2.45
10	14	15	−1.3	−4.5	1.69	20.25	5.85
	153	195			200.1	262.5	94.5

$\therefore \bar{x} = \frac{\Sigma x}{n} = \frac{153}{10} = 15.3\%$

$\therefore \bar{y} = \frac{195}{10} = 19.5\%$

$\therefore \sigma x = \sqrt{\frac{200.1}{10}} = 4.47\%$

$\sigma y = \sqrt{\frac{262.5}{10}} = 5.12\%$

$\therefore cov(x,y) = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{n}$

$= \frac{94.5}{10} = 9.45$

$\therefore$ coefficient of correlation $= \frac{cov(x,y)}{\sigma x\, \sigma y} = \frac{9.45}{4.47 \times 5.12}$

$= 0.413$ (Ans)

Q1. a → 9.45

Q2. b → 0.41

10 times raw data

Exm CASE STUDY-4

Q1. $\bar{X} = 13\%$ $\bar{Y} = 15\%$

$\therefore E(R_p) = 13 \times .4 + 15 \times .6$
$= 14.2\%$ (c).

$r = 1$ (∵ 10 → 16 = 6, 12 → 18 = 6; ∴ 6/6 = 1; slope moving same direction)

Q2. $\sigma A = 3\%$ (b).

$(x-\bar{x})^2$

9

9

$\frac{9}{16\ 12}$ $= \sqrt{9} = 3\%$

$\frac{9}{9}$ σ_B

$\sqrt{18/2} = 3\%$

Q3 $COV(A,B) = r\,\sigma_A\,\sigma_B$
$= 1 \times 3 \times 3$
$= 9\%$ (b).

2 stock ka 2 yrs ka data given
so ⇒ Q4. $r = 1$ (a).

then r will be -1 or +1

Q5. $\sigma p = .4 \times 3 + .6 \times 3$
$= 3\%$ (d) $\left(\because r = 1 \therefore \sigma p = \text{Wtd Avg}\right)$

Future data
CASE STUDY 5 → A ka mean, sd, B ka mean, sd → nei dia hai

Imp to Remember → Agar raw data dia hua hai to jo prob. sume me col^n or portfolio ka mean sd pucha (stock ka mean sd nei pucha) do not waste ur time into making below col^n

10 col^ns = P X Y Px Py $X-\bar{X}$ $Y-\bar{Y}$ $P(X-\bar{X})^2$ $P(Y-\bar{Y})^2$ $P(X-\bar{X})(Y-\bar{Y})$

P	X	Y	PX	PY	$X-\bar{X}$	$Y-\bar{Y}$	$P(X-\bar{X})^2$	$P(Y-\bar{Y})^2$	$P(X-\bar{X})(Y-\bar{Y})$
0.05	6	8	0.3	0.4	-13	-19	8.45	18.05	12.35
0.20	12	18	2.4	3.6	-7	-9	9.8	16.2	12.6
0.50	20	28	10	14	1	1	0.5	0.5	0.5
0.20	24	34	4.8	6.8	5	7	5	9.8	7
0.05	30	44	1.5	2.2	11	17	6.05	14.45	9.35
			19	27	~~-8~~		29.8	59	41.8

$\therefore \bar{X} = 19\%$

Q1. 19% (b) $\quad \bar{Y} = 27\%$ $\quad COV = 41.8$

Q3. 27% (d). $\quad \therefore \sigma x = \sqrt{29.8} = 5.46\%$ $\quad r = \frac{COV}{\sigma x\,\sigma y}$

Q2. 5.46% (c). $\quad \therefore \sigma y = \sqrt{59} = 7.68\%$ $\quad = \frac{41.8}{5.46 \times 7.68}$

Q4. 7.68% (a)

$\therefore$ cov = 41.8

$$r = \frac{41.8}{5.46 \times 7.68}$$

= 0.9968 → in dono stock ko portfolio me nai milana chaie qki jyada fayda nei hai risk jyada katega nei.

70% 30%

$$\sigma p = \sqrt{(0.7 \times 5.46)^2 + (0.3 \times 7.68)^2 + 2 \times 0.7 \times 0.3 \times 41.8}$$

= ~~4.87~~% 6.12%

Qs. 6.12% (b)

<u>Imp. piece of advise</u>

Raw data
- Past: Yrs 1 2 3 4; R_A ✓✓ ✓✓; R_B ✓✓ ✓✓
- Future: Prob 0.6 0.3 0.1; R_A ✓ ✓ ✓; R_B ✓ ✓ ✓

& they straight away ask about $E(R_p)$ & σp

No need to make 8-10 columns

Simply make a coloumn for R_p.

Prob	$R_p = 0.7x + 0.3y$	Px	$P(x-\bar{x})^2$
0.05	6.6%	0.33	10.95
0.20	13.8%	2.76	11.55
0.50	22.4%	11.2	0.5
0.20	27%	5.4	6.27
0.05	34.2%	1.71	8.19
		21.4	37.462

$\therefore \sigma p = \sqrt{34.46}$

= 5.12

Imp
CASE STUDY 6

	Gold	Stock Mkt
Avg return	8%	20%
sd	25%	22%
Correlation		0.4

Q1. Stocks (b) ∵ return ↑ + risk ↓

Q2. By diversifying into both assets (c)

Q3. $E(R_p) = 14\%$ ✓

∴ a) $(0.5\times25)^2 + (0.5\times22)^2 + 2\times0.5\times0.5\times0.4\times25\times22$

a) $\sigma_p^2 = 387.25$ ✓

$\therefore \sigma_p = 19.68\%$