-:- Types of Sums :-

- **Type 1(a):** CF given , I given → Real ... (diya hua tha)
  kc given (Q. is silent : assume kc is nominal)
  Inflation given
  Calculate NPV.

  Two solutions → Nominal CF & Nominal kc.
  → Real CF & Real kc.

- **Type 1(b):** kc given → Nominal
  CF given → (Q. is silent : assume real), I given
  Inflation given

- **Type 1(c):** kc given → Real
  CF given → (Q. is silent : assume nominal)
  I given
  Inflation given

- **Type 1(d):** CF given → Nominal , I given
  kc given → (Q. is silent : assume real)
  Inflation given
  Calculate NPV

		Cost of Capital (kc)	
		Nominal	Real
CF	Nominal		✓
	Real	✓	

Q.1

Since CF's are nominal, assume $k_c = 10\%$ is real.

→ Method 1: Nominal CF's & Nominal k_c.

Nom. $k_c = (1.10 \times 1.05) - 1 = 15.5\%$

Years	Nominal CF	Df @ 15.5%	Present Value
1	30	0.866	25.97
2	40	0.749	29.98
3	30	0.649	19.47
			75.42
	(-) Initial Investment		(72)
	NPV		3.42

→ Method 2: Real CF's & Real k_c.

Years	Nominal CF	Real CF	Df @ 10%	Present Value
1	30	28.57	0.909	25.97
2	40	36.29	0.826	29.96
3	30	25.92	0.751	19.47
				75.40
	(-) Initial Investment			(72.00)
	Net Present Value			3.40

$\cong 3.42$

- Type 2: Taxation & different Inflation for Revenue & Cost.

DTS = $t \times$ deprⁿ → contractually fixed (not affected by inflation)

CFAT = $(R - C - \text{Depr}^n)(1-t) + \text{Depr}^n$

OR

$= (R - C)(1-t) + \text{DTS}$ ← (Deprⁿ Tax Shield)

Different inflation for revenue & cost
↳ Nominal CF & Nominal kc
U will be given revenue & cost in real terms, u have to make them nominal by incorpating cumulative inflation.
Then calculate Nominal CFAT = $(R-C)(1-t) + DTS$
Then discount using kc which is assumed to be nominal.

Q.2

CF real ∴ kc nominal
Assumed.

Calculation of NPV.

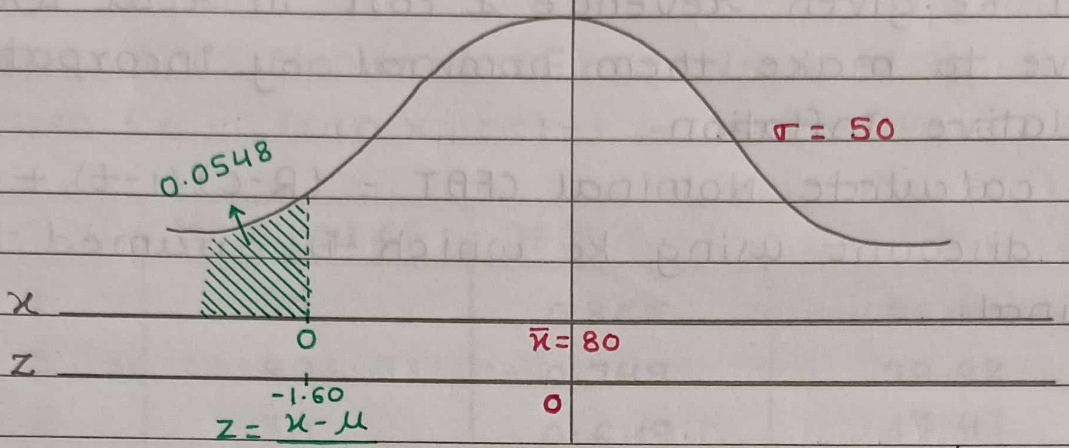
Years	1	2	3	4	5
Nominal Revenue	(15×1.06) 15.9	$(18 \times 1.06 \times 1.055)$ 20.13	$(19 \times 1.06 \times 1.055^2)$ 22.42	$22.42 \times 1.05 \times 17/19$ 21.06	$21.06 \times 1.05 \times 13/17$ 16.91
Nominal cost	12.9	16.76	19.17	18.53	15.43
DTS (0.3 x 2 crore)	0.7	0.7	0.7	0.7	0.7
Nominal CF $(R-C)(1-t) + DTS$	2.65	2.89	2.82	2.36	1.68
PV @ 13%.	2.34	2.26	1.95	1.44	0.90

$$NPV = 2.34 + 2.26 + 1.95 + 1.44 + 0.90 - 10$$
$$= 8.89 - 10$$
∴ $NPV = -1.11$ crore

Risk Analysis → STATISTICAL TECHNIQUES

Warm up :-
A project is risky ..... it's NPV is uncertain. It infact follows a Normal Distribution with a mean of 80 Lakhs & S.D. of 50 lakhs. Firm has a strict policy

of accepting only those projects where probability of negative NPV at most 30% .... ADVICE the firm.



$z = \frac{x-\mu}{\sigma}$

$= \frac{0-80}{50}$

$= -1.60$

z	Prob. of one tail
1.6	0.0548

$\therefore$ Prob. of (-) NPV = 5.48%.

Project is accepted since 5.48% < 30%.

Self note : Isse yeh samaj aya ki Risk analysis me Statistical Techniques k andar mean of NPV & σ NPV nikal k kya karte hai ......

But icai ka focus is on calculation of mean of NPV & σ of NPV.

Imp : to avoid double counting of risk, use 'R_f' as discount rate in this section.

Case 1 : kc = 15% , Risk premium = 8%

$R_f = \frac{1.15}{1.08} - 1 = 6.48\%$

[can't use additive model - R_f = 15 - 8 = 7% ← wrong. RADR was an exception]

Case 2 : $ke = 18\%$, cost of debt $= 12\%$
$t = 30\%$, $D/E = 0.5$
RP included in $kc = 6\%$
$R_f = ?$

→ $D/E = 0.5$ $\therefore$ $W_d = \frac{0.5}{1.5} = \frac{1}{3}$ & $W_e = \frac{2}{3}$

post tax $kd = i(1-t) = 12 \times 0.7 = 8.4\%$
$kc = W_d\, kd + W_e ke = \frac{1}{3} \times 8.4 + \frac{2}{3} \times 18 = 14.8\%$
$RP = 6\%$
$\therefore R_f = \frac{1.148}{1.06} - 1 = 8.3\%$

Case 3 : $kc = 12\%$, $R_f = 7\%$
Discount rate = ? $\underline{\underline{7\%}}$ (R_f)

Case 4 : $kc = 12\%$, R_f → not given
Discount rate = ? 12% (kc) ← wrong but kuch nahi kar sakte.

Q.1) If I want u to calculate mean & σ of NPV of project, which 2 columns should I give?

→

Prob. (P)	NPV (x)	$P(x-\bar{x})$	Px
0.3	-10	151.875	-3
0.5	15	3.125	7.5
0.2	40	151.250	8
		$\sigma^2 = 306.25$	$\bar{x} = 12.5$

Standard Deviation (σ) = 17.5

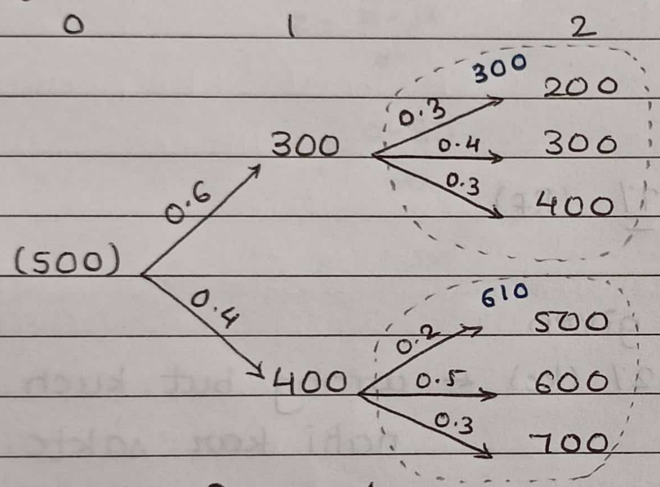
Q.2) If NPV of project is uncertain, what is source of this uncertainty?
→ It is due to uncertain CF.

Q.3) So what do u normally expect sums of this section to contain?

→ Probability distribution of CF & we have to use the same to calculate mean & σ of NPV.

<u>Note</u> : ICAI .... when it removed cap. budg. from final & took it to inter, they compromised at various places & asked a student to just calculate mean & σ of CF - this makes icai stuff hotch potch.

Eg: Consider a risky 2 years project :



Path	Joint Prob.	NPV
1	0.18	-39.1
2	0.24	49.9
3	0.18	138.9
4	0.08	322.2
5	0.20	411.2
6	0.12	500.2

kc = 14%, Rf = 6%

Calculate mean, σ & C.V. of NPV

The firm's existing project have a C.V. which lies in the range of 90% to 110%. Hence firm uses following guidelines for RADR -

Case 1 - C.V. of project < 90%, deduct 2% from kc.

Case 2 - C.V. of project > 110%, add 2% to kc.

Case 3 - C.V. of project falls b/w 90% & 110%, use kc.