METHODS FOR MAKING ECONOMY STUDIES

E.1.

BY ROR METHOD:

INVESTMENT	270,000
SALVAGE VALUE	27,000
REVENUE	185,400

FOR ANNUAL COST:

OP & MAINT.	81,000
TAX & INS. (0.04 × 270,000)	10,800
DEPRECIATION $\frac{270,000-27,000}{F/A, 25\%, 5}$	
$\frac{270,000-27,000}{\left[\frac{(1.25)^5-1}{0.25}\right]}$	29,608.76
TOTAL A.C.	121,408.76

NET ANNUAL PROFIT = ANNUAL REVENUE − ANNUAL COST

= 185,400 − 121,408.76

NET ANNUAL PROFIT = 63,991.24

$$ROR = \frac{63,991.24}{270,000.00} \times 100\% = 23.70\%$$

CONCLUSION: SINCE ROR IS LESS THAN 25%, THE INVESTMENT IS NOT JUSTIFIED.

BY USING ANNUAL WORTH

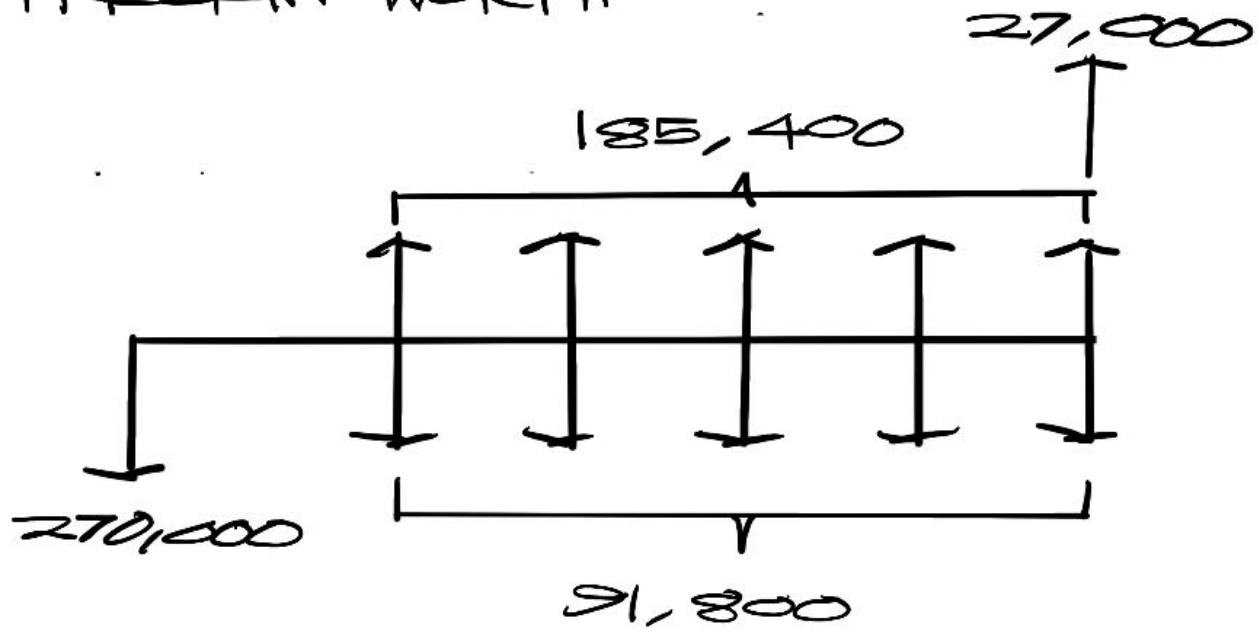
ANNUAL COST (SEE ROR METHOD)	121,408.76
INTEREST ON CAPITAL (0.25 × 270,000)	67,500.00
TOTAL A.C.:	188,908.76

NET ANNUAL PROFIT = 185,400 − 188,908.76

= −3,508.76

CONCLUSION: SINCE THE ANNUAL PROFIT (−3,508.76) IS LESS THAN ZERO, THE INVESTMENT IS NOT JUSTIFIED.

BY USING PRESENT WORTH



ANNUAL COST (EXCLUDING DEPRECIATION) = 10,800 + 81,000
= 91,800

FOR CASH INFLOWS:

$$P_{INFLOW} = 185,400[P/A, 25\%, 5] + 27,000[P/F, 25\%, 5]$$

$$= 185,400\left[\frac{1-(1.25)^{-5}}{0.25}\right] + 27,000(1.25)^{-5}$$

$$P_{INFLOW} = 507,439.87$$

FOR CASH OUTFLOWS;

$$P_{OUTFLOW} = 270,000 + 91,800[P/A, 25\%, 5]$$

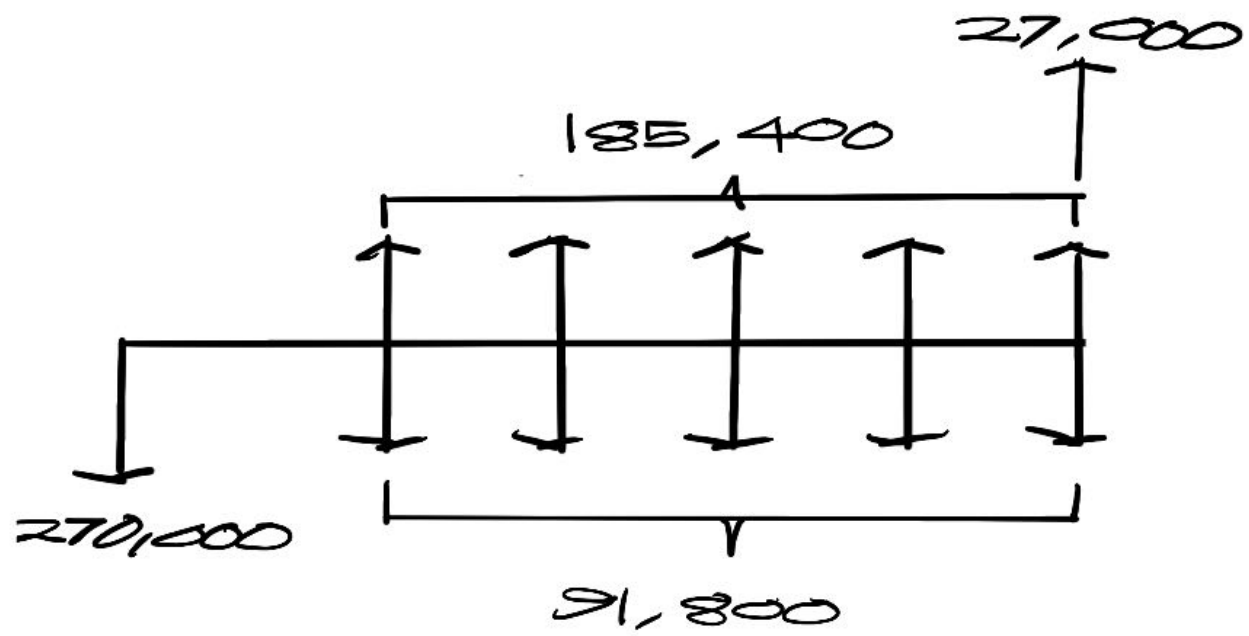
$$= 270,000 + 91,800\left[\frac{1-(1.25)^{-5}}{0.25}\right]$$

$$P_{OUTFLOW} = 516,875.90$$

NET CASH FLOW = 507,439.87 − 516,875.90
= −9,436.03

CONCLUSION: SINCE THE NET CASH FLOW IS LESS THAN ZERO THE INVESTMENT IS NOT JUSTIFIED

BY USING FUTURE WORTH:



FOR INFLOW:

$$F_{INFLOW} = 185{,}400\,[F/A, 25\%, 5] + 27{,}000$$

$$= 185{,}400\left[\frac{(1.25)^5 - 1}{0.25}\right] + 27{,}000$$

$$F_{INFLOW} = 1{,}548{,}583.59$$

FOR OUTFLOW:

$$F_{OUTFLOW} = 270{,}000\,[F/P, 25\%, 5] + 91{,}800\,[F/A, 25\%, 5]$$

$$= 270{,}000\,(1.25)^5 + 91{,}800\left[\frac{(1.25)^5 - 1}{0.25}\right]$$

$$F_{OUTFLOW} = 1{,}577{,}380.08$$

NET CASH FLOW = 1,548,583.39 − 1,577,380.08

= −28,796.49

CONCLUSION: SINCE THE NET CASHFLOW IS LESS THAN ZERO
THE INVESTMENT IS NOT JUSTIFIED

FOR PAYBACK PERIOD:

TOTAL ANNUAL COST = 91,800

NET CASHFLOW = 185,400 − 91,800 = 93,600

$$\text{PAYBACK PERIOD} = \frac{270{,}000 - 27{,}000}{93{,}600}$$

PAYBACK PERIOD = 2.6 YRS

E.5

BY USING ROR ON ADDITIONAL INVESTMENT:

	TYPE A	TYPE B
OP COST	32,000	34,000
LAB COST	50,000	32,000
PAYROLL TAX	0.04×50,000 = 2,000	0.04×32,000 = 1280
TAX & INS.	0.03×200,000 = 6,000	0.03×300,00 = 9,000
TOTAL	90,000	66,280
DEPRECIATION	$\frac{200,000-0}{P/A,15\%,10} = \frac{200,000}{\left[\frac{(1.15)^{10}-1}{0.15}\right]}$ = 9,850.41	$\frac{300,00-0}{P/A,15\%,10} = \frac{300,000}{\frac{(1.15)^{10}-1}{0.15}}$ = 14,775.62
TOTAL ANNUAL COST	99,850.41	81,055.62

$$ROR = \frac{|99,850.41 - 81,055.62|}{|200,000 - 300,000|} \times 100\% = 18.79\%$$

CONCLUSION: SINCE ROR IS SATISFACTORY (18.79% > 15%), TYPE B SHOULD BE SELECTED.

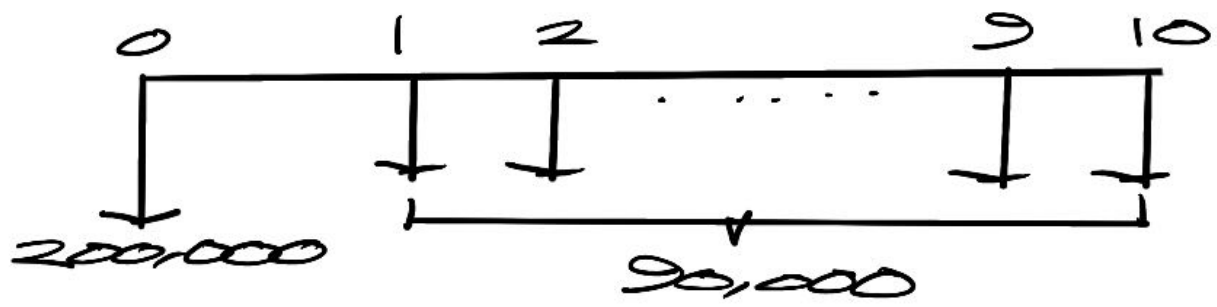
USING ANNUAL COST

	TYPE A	TYPE B
ANNUAL COST (SEE ROR)	99,850.41	81,055.62
INTEREST ON CAPITAL	0.15×200,000 = 30,000	0.15×300,000 = 45,000
TOTAL ANNUAL COST	129,850.41	126,055.62

CONCLUSION: SINCE THE ANNUAL COST OF TYPE B < TYPE A, TYPE B SHOULD BE SELECTED.

BY USING PRESENT WORTH COST:

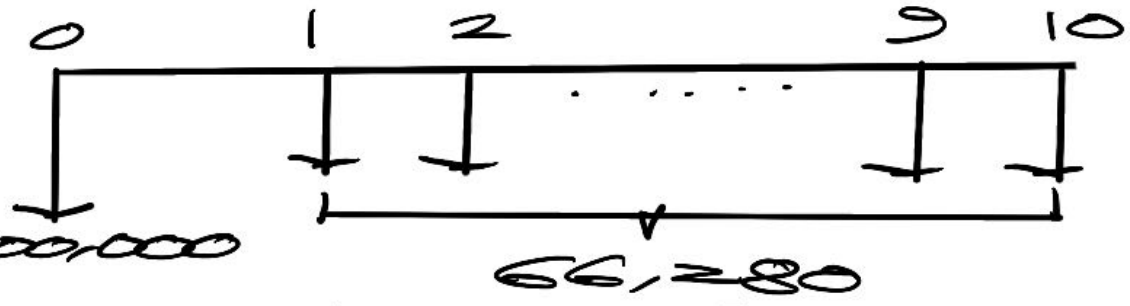
TYPE A:



$P_A = 200{,}000 + 90{,}000[P/A, 15\%, 10] = 200{,}000 + 90{,}000\left[\frac{1-1.15^{-10}}{0.15}\right]$

$P_A = 651,689.18$

TYPE B:



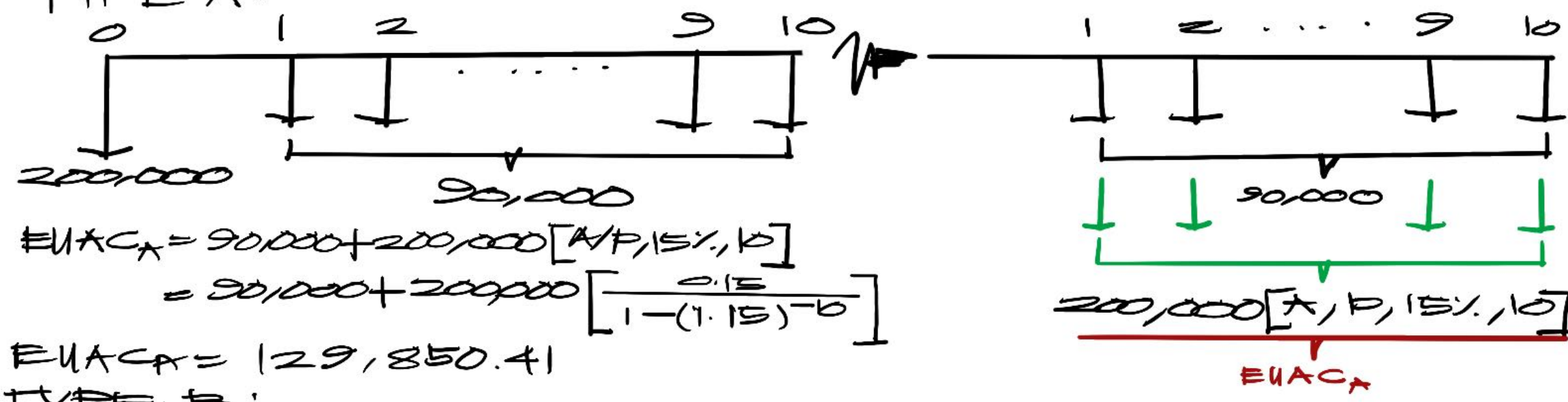
$P_B = 300{,}000 + 66{,}280[P/A, 15\%, 10] = 209{,}000 + 66{,}280\left[\frac{1-1.15^{-10}}{0.15}\right]$

$P_B = 632,643.98$

CONCLUSION: SINCE THE PRESENT WORTH COST OF TYPE B < TYPE A
TYPE B SHOULD BE SELECTED.

BY USING EQUIVALENT UNIFORM ANNUAL COST:

TYPE A:

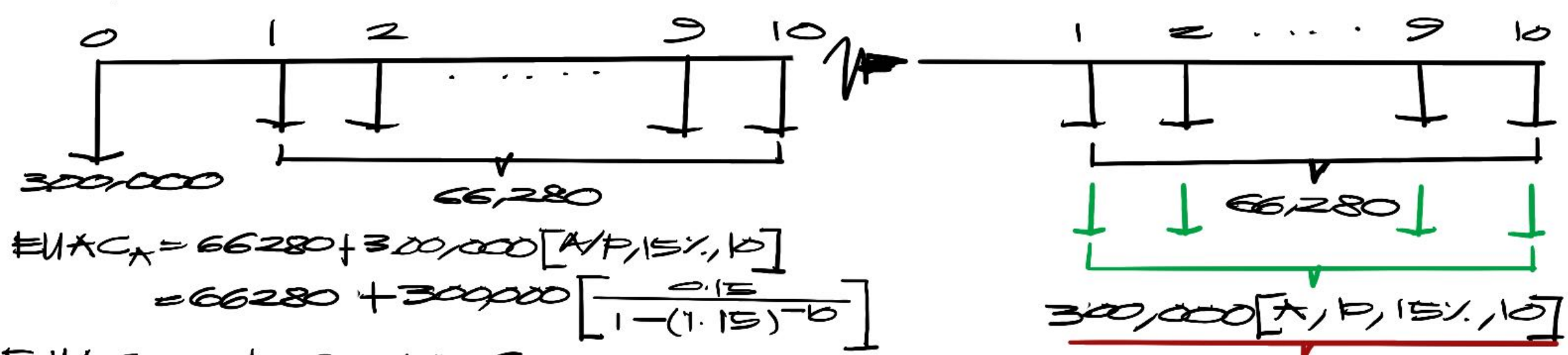


$EUAC_A = 90{,}000 + 200{,}000[A/P, 15\%, 10]$

$= 90{,}000 + 200{,}000\left[\frac{0.15}{1-(1.15)^{-10}}\right]$

$EUAC_A = 129,850.41$

TYPE B:



$EUAC_A = 66280 + 300{,}000[A/P, 15\%, 10]$

$= 66280 + 300{,}000\left[\frac{0.15}{1-(1.15)^{-10}}\right]$

$EUAC_A = 126,055.62$

CONCLUSION: SINCE THE $EUAC_B < EUAC_A$, TYPE B SHOULD BE SELECTED.