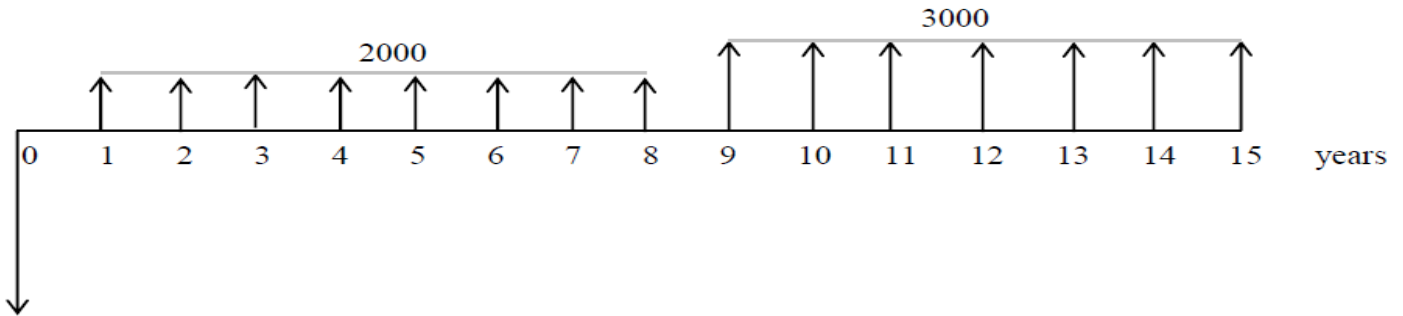


## Tutorial 5

1- For the following cash flow diagram, determine the payback period if interest rate is 12% per year.



14000

$$0 = -P + NCF(P/A, i, n_p) \implies 0 = -14,000 + 2,000(P/A, 12\%, 8) + 3,000(P/A, 12\%, n_p - 8)(P/F, 12\%, 8)$$

WHY?

$$n_p = 12.55 \text{ years}$$

2- A certain manufacturing alternative has a first cost of \$6,000, an annual cost of \$400 and a salvage value of \$2000 after its 10-year life. It is expected that an annual income of \$1600 can be earned by such investment. Consider rate of return at 18% and determine:

- a) whether this investment should be done or not?
- b) the salvage value in order to earn 16% rate of return.

$$a) P_0 = -6,000 - 400(P/A, 18\%, 10) + 1,600(P/A, 18\%, 10) + 2000(P/F, 18\%, 10) = -224.89 < 0$$

It is not an economic alternative.

$$b) 0 = -6,000 - 400(P/A, 16\%, 10) + 1,600(P/A, 16\%, 10) + X(P/F, 16\%, 10)$$

$$X = 882.9$$

3- Compare the alternatives below on the base of AW analysis an interest rate of 14.224% per year compounded quarterly.

	A	B
First cost, \$	45,000	24,000
Annual operating cost, \$/year	31,000	35,000
Overhaul (cost) in years 2 and 4, \$	-	6,000
Overhaul (cost) in year 5, \$	12,000	-
Salvage Value (receipt), \$	10,000	8,000
Life, years	8	6

$$\text{Effective } i/\text{year} = (1 + 0.14224/4)^4 - 1 = 0.15 \text{ or } 15\% \text{ per year.}$$

$$\begin{aligned} AW_A &= -45,000(A/P,15\%,8) - 31,000 - 12,000(P/F,15\%,5) (A/P,15\%,8) + 10,000(A/F,15\%,8) \\ &= -45,000(0.22285) - 31,000 - 12,000(0.4972) (0.22285) + 10,000(0.07285) \\ &= \$-41,629 \end{aligned}$$

$$\begin{aligned} AW_B &= -24,000(A/P,15\%,6) - 35,000 - 6000[(P/F,15\%,2) + (P/F,15\%,4)] (A/P,15\%,6) + \\ &\quad 8000(A/F,15\%,6) \\ &= -24,000(0.26424) - 35,000 - 6,000[0.7561 + 0.5718] (0.26424) + 8000(0.11424) \\ &= \$-42,533 \end{aligned}$$

Select A.