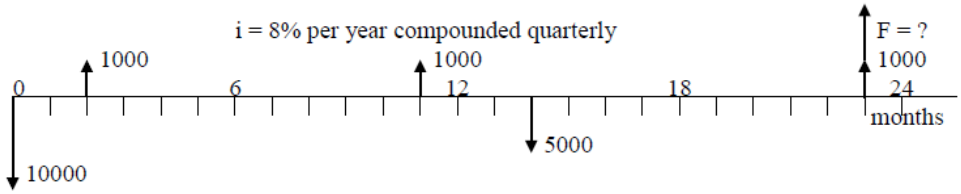
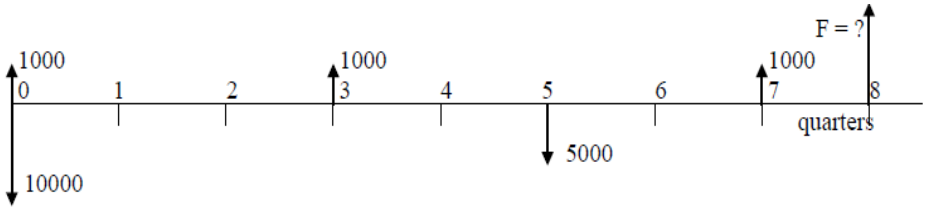
1) I deposit $10000 into my account which pays interest at 8% per year, compounded quarterly. If I withdraw $1000 in months 2, 11, and 23 from now, and make an additional deposit of $5000 in month 14 from now, how much would I have in my account at the end of two years? Assume no inter-period compounding.



Since no inter-period compounding, cash flow modifies to the following with the interest rate at 2% per quarter. Move $1000 withdrawal in month 2 to time 0. Move $1,000 withdrawal in month 11 to month 9 (quarter 3). Move $1000 withdrawal in month 23 to month 21 (quarter 7). Move $5000 deposit in month 14 to month 15 (quarter 5).



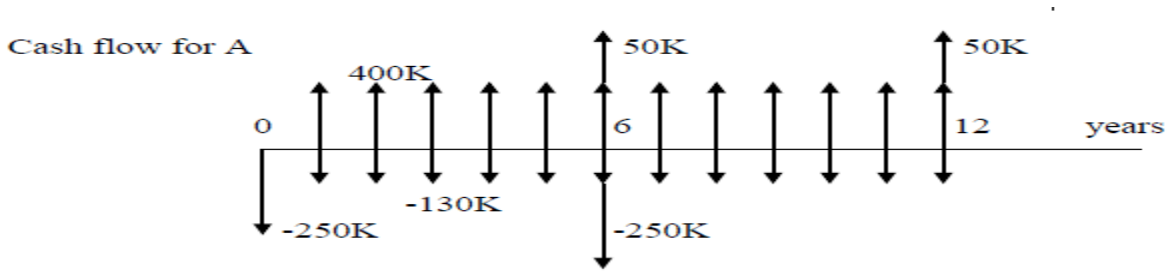
F = (10,000 – 1000)(F/P,2%,8) – 1000(F/P,2%,5) – 1000(F/P,2%,1) + 5000(F/P,2%,3)
= 9000(1.1717) – 1000(1.1041) – 1000(1.0200) + 5000(1.0612) = $13727.2

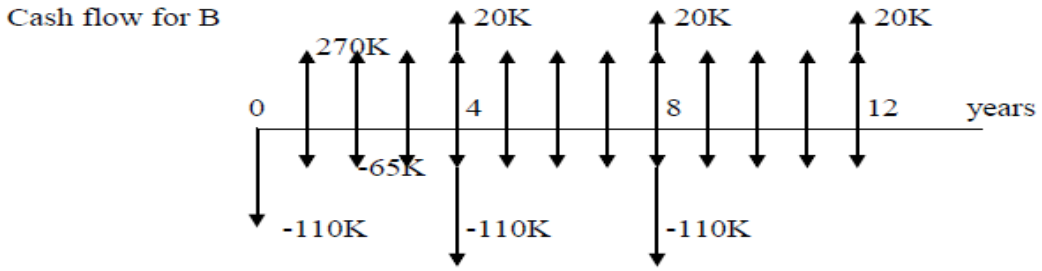
2- a) Which of the following alternatives should be chosen if MARR is %18 per year.

	A ($)	**B($)**
First cost	**-250,000**	**- 110,000**
Annual operating cost	**-130,000**	**- 65,000**
Annual revenues	**400,000**	**270,000**
Salvage value	**50,000**	**20,000**
Life	**6**	**4**

b) If the projects are independent, what will be your decision?

We have different lives for the alternatives. Comparison must be made over the same period, i.e. LCM of years since a study period is not stated. For these alternatives LCM = 12. Therefore, cash flows must be extended to 12 years by assuming that costs and revenues of Project A is repeated for another cycle (total of two cycles) and of Project B, another two cycles (total of three cycles). The resultant cash flows are as follows:

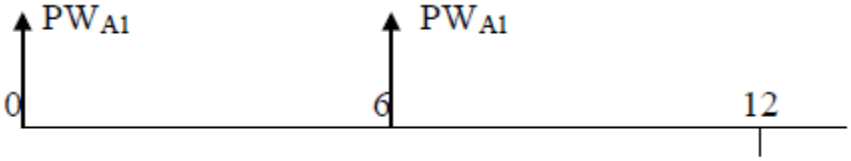




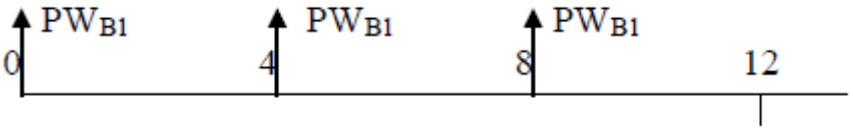
PW_A = -250000 – 250000(P/F,18%,6) + (400000 – 130000)(P/A,18%,12) + 50000(P/F,18%,6) + 50000(P/F,18%,12) = 976944

PW_B = -110000 – 110000(P/F,18%,4) – 110000(P/F,18%,8) + (270000 – 65000)(P/A,18%,12) + 20000(P/F,18%,4) + 20000(P/F,18%,8) + 20000(P/F,18%,12) = 804988

We select A as its PW is larger.
The solution can also be reached by the following method:
If we calculate the PW of each project for one cycle only, the cash flows reduce to:



Cash flow diagram for A where PW_{A1} is the PW of one cycle only given by,
PW_{A1} = -250000 + (400000 – 130000)(P/A,18%,6) + 50000(P/F,18%,6) = 712873.5



Cash flow diagram for B where PW_{B1} is the PW of one cycle only given by,
PW_{B1} = -110000 + (270000 – 65000)(P/A,18%,4) + 20000(P/F,18%,4) = 451786
Then,
$PW_A = PW_{A1}[1 + (P/F,18\%,6)] = 712873.5(1 + 0.37043) = 976943$
$PW_B = PW_{B1}[1 + (P/F,18\%,4) + (P/F,18\%,8)] = 451786(1 + 0.5158 + 0.2660) = 804992$
We have the same result.
(b) If projects are independent, we select both as their PW > 0.

3- Company X is considering the Projects that have the following costs:

	Project A	**Project B**
First cost	**$15000**	**$18000**
Annual Operating Costs	**3500**	**3100**
Salvage Value	**1000**	**2000**
Life, years	**6**	**9**

Using a MARR value of 15% per year, determine which alternative should be selected on the basis of a present-worth analysis.

Evaluation is to be carried out over 18 (LCM) years since a study period is not given.

PW_A = -15000[1 + (P/F,15%,6) + (P/F,15%,12)] + 1000[(P/F,15%,6) + (P/F,15%,12) + (P/F,15%,18)] – 3500(P/A,15%,18) = -45036

PW_B = -18000[1 + (P/F,15%,9)] + 2000[(P/F,15%,9) + (P/F,15%,18)] –3100(P/A,15%,18) = -41384

Select B as its PW is numerically larger.