

Rules:

1. $PV_n = Y \times \frac{1}{(1+i)^n}$
2. *NPV of all Benefits = PV_1 of benefits + PV_2 of benefits + ... + PV_n of benefits*
3. *NPV of all costs = One time Costs + PV_1 of Recurring Costs + PV_2 Recurring Costs + ... + PV_n Recurring Costs*
4. *Overall NPV = NPV of all Benefits – NPV of all costs*
5. *Over all ROI = $\left(\frac{\text{Over all NPV}}{\text{NPV of all costs}} \right)$*
6. *Yearly NPV Cash flow = PV of Benefits – PV of costs*
7. *Overall NPV Cash Flow = NPV of all Benefits – NPV of all costs*
8. *Break – Even Ratio(fraction) = $\frac{\text{Yearly NPV Cash Flow} - \text{Over all NPV Cash flow}}{\text{Yearly NPV Cash Flow}}$*

Q1) Assuming monetary benefits of an information system at \$50,000 per year, one-time costs of \$90,000, recurring costs of \$40,000 per year, and a three-year time horizon. Use a 10 percent discount rate and round the numbers to two decimal places, calculate the net present value of these costs and benefits of an information system. Also calculate the overall return on investment of the project and then present a break-even analysis. At what point does break-even occur?

	Year of Project				TOTALS
	Year 0	Year 1	Year 2	Year 3	
Net monetary benefit	0	50,000	50,000	50,000	
Discount Rate (10%)	$=1/(1+.1)^0$ =1	$=1/(1+.1)^1$ =0.91	$=1/(1+.1)^2$ =0.83	$=1/(1+.1)^3$ =0.75	
PV of benefits	\$0.00	\$45,500.00	\$41,500	\$37,500	
NPV of all BENEFITS	\$0.00	\$45,500.00	\$87,000.00	\$124,500.00	\$124,500.00
One-time COSTS	-\$90,000.00				
Recurring Costs	\$0.00	-\$40,000	-\$40,000	-\$40,000	
Discount Rate (10%)	1	0.91	0.83	0.75	
PV of Recurring Costs	\$0.00	-\$36,400	-\$33,200	-\$30,000	
NPV of all COSTS	-\$90,000.00	-\$126,400.00	-\$159,600.00	\$189,600.00	-\$189,600.00
Overall NPV					<u><u>-\$65,100.00</u></u>
Overall ROI - (Overall NPV/ NPV of all COSTS)					<u><u>-0.34</u></u>
Break-Even Analysis					
Yearly NPV Cash Flow	-\$90,000	\$9,100.00	\$8,300	\$7,500	
Overall NPV Cash Flow	-\$90,000	-\$80,900.00	-\$72,600	-\$65,100	
Project break-even occurs	does not occur.				

Q2) Change the one-time costs in question 1 to \$10,000 and redo the analysis.

	Year of Project				TOTALS
	Year 0	Year 1	Year 2	Year 3	
Net monetary benefit	0	50,000	50,000	50,000	
Discount Rate (10%)	1	0.91	0.83	0.75	
PV of benefits	\$0.00	\$45,500.00	\$41,500	\$37,500	
NPV of all BENEFITS	\$0.00	\$45,500.00	\$87,000.00	\$124,500	\$124,500.00
One-time COSTS	-\$10,000				
Recurring Costs	\$0.00	-\$40,000	-\$40,000	-\$40,000	
Discount Rate (10%)	1	0.91	0.83	0.75	
PV of Recurring Costs	\$0.00	-\$36,400	-\$33,200	-\$30,000	
NPV of all COSTS	-\$10,000	-\$46,400	-\$79,600	-\$109,600	-\$109,600
Overall NPV					<u><u>\$14,900</u></u>
Overall ROI - (Overall NPV/ NPV of all COSTS)					<u><u>0.14</u></u>
Break-Even Analysis					
Yearly NPV Cash Flow	-\$10,000	\$9,100	\$8,300	\$7,500	
Overall NPV Cash Flow	-\$10,000	-\$900	\$7,400	\$14,900	

Project break-even occurs between years 1 and 2
 Use first year of positive cash flow to calculate
 break-even fraction = $((8300 - 7400)/8300)$ 0.11
 Actual break-even occurred at 1.11 years

