16/11/2020

Numerical Modelling Lab-I (MI59001) [ENDSEM]

16M131022
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Effective tax rate = 30%.

Intial discount rate = 40 + 4

= 40 + 22 ...(Roll: 16M131022)

= 62%

n = 5 years, t = 0.3, d = 0.62

Capital cost	Operating cost	Revenue	Year
70	10	0	0
15	20	10	1
10	50	80	2
0	40	160	3
0	40	140	4
0	50	140	5

Gross Profit	Net Profit	Cash flow	Year
-70	-10	-80	0
-10	-10	-25	1
30	21	11	2
120	84	84	3
100	70	70	4
90	63	63	5

Year	Cash Flow	Discounted cash Flow
0	-80	-80
1	-25	-15.43
2	11	4.911
3	84	19.7576
4	70	10.1633
5	63	5.6463

NPV = -59.8628

$$-\frac{CF0}{(1+Ir)^0} + \frac{CF1}{(1+Ir)^1} + \frac{CF2}{(1+Ir)^2} + \frac{CF3}{(1+IR)^3}$$

$$+\frac{CF4}{(1+Ir)^4} + \frac{CF5}{(1+Ir)^5} = 0$$

Let $Ir = R$

$$80 = \frac{-25}{1+R} + \frac{11}{(1+R)^2} + \frac{84}{(1+R)^3}$$

$$+\frac{70}{(1+R)^4} + \frac{63}{(1+R)^5}$$

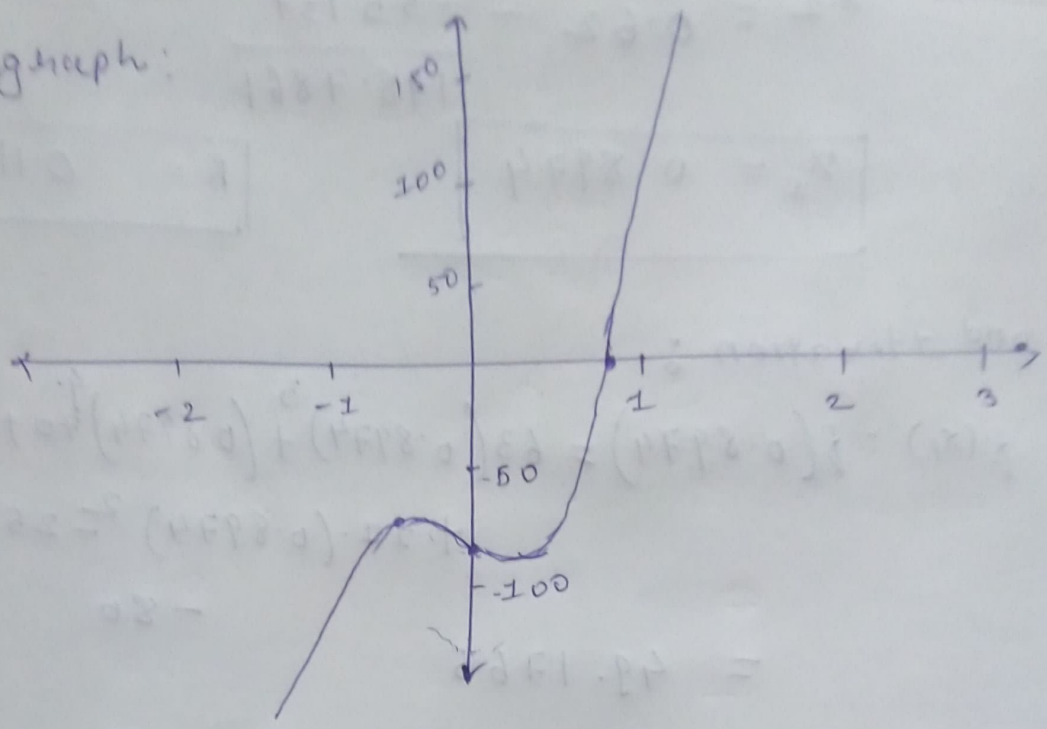
Let $\frac{1}{1+R} = x \Rightarrow R = \frac{1}{x} - 1$

$$80 = -25x + 11x^2 + 84x^3 + 70x^4 + 63x^5$$

∴ Aim to solve the equation for x

$63x^5 + 70x^4 + 84x^3 + 11x^2 - 25x - 80 = 0$

Rough graph:



$f(x) = 63x^5 + 70x^4 + 84x^3 + 11x^2 - 25x - 80$

$f'(x) = 315x^4 + 280x^3 + 252x^2 + 22x - 25$

$x_0 = 0.62$

1st Iteration:

$f(x_0) = f(0.62) = 63(0.62)^5 + 70(0.62)^4 + 84(0.62)^3 + 11(0.62)^2 - 25(0.62) - 80$

$= -55.137$

$f'(x_0) = f'(0.62) = 315(062)^4 + 280(0.62)^3 + 252(0.62)^2 + 22(0.62) - 25$

$= 198.7861$

$$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$$

$$x_1 = 0.62 - \frac{-55.137}{198.7861}$$

$$\boxed{x_1 = 0.8974} \qquad \boxed{R = 0.11433}$$

2nd iteration :

$$f(x_1) = f(0.8974) = 63(0.8974)^5 + (0.8974)^4 + 70 + 84(0.8974) + 11\cdot(0.8974)^2 - 25\cdot(0.8974) - 80$$

$$= 49.1765$$

$$f'(x_1) = f'(0.8974) = 315(0.8974)^4 + 280(0.8974)^3 + 252(0.8974)^2 + 22(0.8974) - 25$$

$$= 604.2696$$

$$x_2 = x_1 - \frac{f(x_1)}{f'(x_1)}$$

$$x_2 = 0.8974 - \frac{49.1765}{604.2696}$$

$$\boxed{x_2 = 0.816} \Rightarrow \boxed{R = 0.22549}$$

The Approximate value of IRR after two iteration :

$$R = \frac{1}{0.816} - 1$$

$$= 0.22549 \Rightarrow 22.549\%$$

$$R = 22.55\%$$

After Running code from [Lab 3] got Final IRR at $x = 0.80148$

$\therefore$ Final IRR $= \frac{1}{0.80148} - 1$

$= 0.24769 \simeq 24.77\%$