HW 9 Annuity Formulae

Wednesday, November 4, 2020 3:45 PM

Passed Solution review

You may want to use a spreadsheet to actually find the solutions to some of these problems. But make sure to write out the equations you need to solve in your answers.

a. What is the present value of 15 annual payments of $100, with the first payment one year from now, if the discount rate is 0.05?

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	t	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
2		95.24	90.70	86.38	82.27	78.35	74.62	71.07	67.68	64.46	61.39	58.47	55.68	53.03	50.51	48.10	1,037.97

b. What is the present value of 15 annual payments of $100, with the first payment right now, if the discount rate is 0.05?

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	t	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
2		95.24	90.70	86.38	82.27	78.35	74.62	71.07	67.68	64.46	61.39	58.47	55.68	53.03	50.51	48.10	1,037.97
3																	
4												Add 100 for first payment					1,137.97

$NPV = 100\sum_{t=0}^{14} 1.05^{-t} = 100 + 100(1-1.05^{-14})/[(1/1.05)/(1-1/1.05)] = 1090$

c. What is the present value of 15 annual payments of $100, with the first payment five years from now, if the discount rate is 0.05?

A	B	C	D	E	F	G	H	I	J	K	L
t	0	1	2	3	4	5	6	7	8	9	
	0.00	0.00	0.00	0.00	0.00	78.35	74.62	71.07	67.68	64.46	
	10	11	12	13	14	15	16	17	18	19	Total
	61.39	58.47	55.68	53.03	50.51	48.10	45.81	43.63	41.55	39.57	853.94

d. At what discount rate would the present value of 15 annual payments of $100, with the first payment right now, be 0?

There's no way that the NPV can be 0 if it's paying out 100 and never charging anything. This will always be positive.

e. How many annual payments of $100, with the first payment right now, would it take to be worth more than $1,000, if the discount rate is 0.05?

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	t	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
2		100.00	95.24	90.70	86.38	82.27	78.35	74.62	71.07	67.68	64.46	61.39	58.47	55.68	53.03	50.51	48.10	1,137.97
3		100.00	195.24	285.94	372.32	454.60	532.95	607.57	678.64	746.32	810.78	872.17	930.64	986.33	1,039.36	1,089.86	1,137.97	
4		i	0.05															1,237.97

It would take 14 annual payments.

f. What is the value of 15 annual payments which begin at $100 one year from now and increase at 2% per year thereafter, if the discount rate is 0.05?

	A	B
1	d	0.97
2	a	11.99
3	PV	1,198.89