

Annuities

An annuity is an arrangement that withdraws both principal and interest from a lump sum in a savings account. This lump sum is frequently referred to as a “nest egg”. An annuity works just like an installment loan except that the bank is paying us instead of the other way around.

Example: Suppose you have saved \$750,000 for retirement and have this money in an account that pays 7.2% APR compounded monthly. If you withdraw \$6000 a month, how long will the money last?

Here is an Excel snippet. See if you can reproduce the spreadsheet and extend it to solve the above problem.

	A	B	C	D	E	F
1	Month	Principal	Interest	Withdrawl	Principal at end of month	
2	1	\$ 750,000.00	\$ 4,500.000	\$ 6,000.00	\$ 748,500.000	
3	2	\$ 748,500.00	\$ 4,491.000	\$ 6,000.00	\$ 746,991.000	
4	3	\$ 746,991.00	\$ 4,481.946	\$ 6,000.00	\$ 745,472.946	
5	4	\$ 745,472.95	\$ 4,472.838	\$ 6,000.00	\$ 743,945.784	
6	5	\$ 743,945.78	\$ 4,463.675	\$ 6,000.00	\$ 742,409.458	
7	6	\$ 742,409.46	\$ 4,454.457	\$ 6,000.00	\$ 740,863.915	
8	7	\$ 740,863.92	\$ 4,445.183	\$ 6,000.00	\$ 739,309.099	
9	8	\$ 739,309.10	\$ 4,435.855	\$ 6,000.00	\$ 737,744.953	
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Note that interest is calculated before the withdrawal is made.

Example: Suppose you plan to retire at age 65 and want to be able to withdraw \$750 per month for 30 years. How much would you need to have in your nest age when you retire? You can solve this problem using a guess and check method on Excel.

Other practice problems:

1. Suppose you have a 20 year annuity with a present value of \$600,000 in an account that pays 5.5%. What is the monthly yield?
2. Suppose you want a monthly yield of \$1500 from you retirement account which pays 7.5% on a 25 year annuity. What size nest egg do you need saved when you retire?