Motivation: Grandpa Simpson is ready for retirement. He has saved $100,000 for his retirement, and plans to withdraw $10,000 at the end of each year. His money remains in a bank account that gets 2% interest compounded annually. When will his money run out?

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Year	Starting Balance	Calculate the interest	New Balance	Withdrawal	Ending Balance
1	100,000	× 1.02	$102,000	-10,000	$92,000
2	92,000	× 1.02	93,840	-10,000	83,840
3	83,840	× 1.02	85,516.80	-10,000	75,516.80
4	75,516.80	× 1.02	77,027.14	-10,000	67,027.14
5	67,027.14	× 1.02	68,367.68	-10,000	58,367.68
6	58,367.68	× 1.02	59,535.03	-10,000	49,535.03
7	49,535.03	× 1.02	50,525.73	-10,000	40,525.73
8	40,525.73	× 1.02	41,336.24	-10,000	31,336.24
9	31,336.24	× 1.02	31,962.96	-10,000	21,962.96
10	21,962.96	× 1.02	22,402.22	-10,000	12,402.22
11	12,402.22	× 1.02	12,650.26	-10,000	2,650.26
12	2,650.26	× 1.02	2,703.27	-2703.27	0
			Totals	112,703.27	

Conclusions: We started with $100,000, but withdrew $112,703.27. The savings continue to make interest as we live off of them.

If you know the lifestyle you want to live when you retire (i.e. how much money you will need every month), it is helpful to be able to calculate how much you need to have saved up! Creating a table from this perspective is challenging, so we will solve these kinds of problems mainly with the TVM Solver.

Example 1 (Calculating the Amount Needed at Retirement)

Mr. Smith thinks he will need about $3,000 per month to maintain his current lifestyle when he is retired. He can invest his money in an RRSP that pays interest at 6% compounded monthly. If he wants to make this money last for 25 years, how much will he need saved up (PV)?

a) How many months are in 25 years?   25×12 = 300

b) Solve for PV: $465,620.59 must be saved up

N:	300 (withdrawals)
I(%):	6
(PV):	−465,620.59
Pmt:	3000
FV:	0
PpY:	12
CpY:	12

c) How much money did Mr. Smith withdraw over these 25 years?

300 withdrawals of $3000 = $900,000

Example 2 (Determining a budget)

Let's say that you've saved up $300,000 for retirement (in the same account as example 1).

Calculate how much you could take out per month if you wanted to make the money last for 20 years (i.e. solve for Pmt).

a) How many months are in 20 years?   20×12 = 240

b) Solve for Pmt: $2149.29 per month

N:	240 (withdrawals)
I(%):	6
PV:	−300,000
(Pmt):	2149.29
FV:	0
PpY:	12
CpY:	12

Example 3 (Determining how long money will last)

If you wanted to live a more luxurious lifestyle and withdraw $5,000 per month, how long would your savings last? Assume we are using the same interest rate, and that you have $300,000 saved for retirement.

a) Solve for N: 72 withdrawals (monthly)

b) How many years will the money last for?

72÷12 = 6 years.

(N):	72 (withdrawals)
I(%):	6
PV:	−300,000
Pmt:	5000
FV:	0
PpY:	12
CpY:	12