
Problem : Withdrawing from a retirement account

A person in retirement is depositing \$300,000 in a saving account that pays 5% interest per year. The person plans to withdraw money from the account once a year. He starts by withdrawing \$25,000 after the first year, and in future years he increases the amount he withdraws according to the inflation rate. For example, if the inflation rate is 3%, he withdraws \$25,750 after the second year. Calculate the number of years the money in the account will last assuming a constant yearly inflation rate of 2%.

Solution

The problem is solved by using a loop (a `while` loop since the number of passes is not known before the loop starts). In each pass the amount to be withdrawn and the account balance are calculated. The looping continues as long as the account balance is larger than or equal to the amount to be withdrawn. The following is a program in a script file that solves the problem. In the program, `year` is a vector in which each element is a year number, `W` is a vector with the amount withdrawn each year, and `AB` is a vector with the account balance each year.

```
rate=0.05; inf=0.02;
clear W AB year
year(1)=0;
W(1)=0;
AB(1)=300000;
Wnext=25000;
ABnext=300000*(1 + rate);
n=2;
    while ABnext >= Wnext
        year(n)=n-1;
        W(n)=Wnext;
        AB(n)=ABnext-W(n);
        ABnext=AB(n)*(1+rate);
        Wnext=W(n)*(1+inf);
        n=n+1;
    end
fprintf('The money will last for %f years',year(n-1))
(bar(year,[AB' W']),2.0
```

First element is year 0.

Initial withdrawal amount.

Initial account balance.

The amount to be withdrawn after a year.

The account balance after a year.

while checks if the next balance is larger than the next withdrawal.

Amount withdrawn in year $n - 1$.

Account balance in year $n - 1$ after withdrawal.

The account balance after additional year.

The amount to be withdrawn after an additional year.