6.2 PROJECT

PAYOUT ANNUITIES: WHAT HAPPENS AFTER YOU RETIRE?

According to Northwestern Mutual, 56% of adults in the US don't know how much money they will need to save to retire. This can be problematic when setting up your long-term financial goals. In this activity, you will explore a financial instrument, called a payout annuity, that can be used to invest after retirement and maintain a steady income.

Suppose you want to have an after-retirement annual income of $50,000 for 20 years.

1. Suppose you plan to place your retirement fund into an account that does not earn interest. How much money would you need in the account by the time you retire?

Without further investing, your retirement fund will sit idle when it could be earning interest. A payout annuity provides regular withdrawals while allowing your balance to earn interest. The following formula is used to calculate the value of a payout annuity that compounds annually and has annual withdrawals.

$$P = \frac{d\left(1-\left(1+r\right)^{-N}\right)}{r}$$

Here, P is the starting balance of the account (that is, the size of your retirement fund), d is the regular annual withdrawal, r is the annual interest rate as a decimal, and N is the number of years you plan to take withdrawals.

2. Suppose that you will invest your retirement fund (the value you found in part 1) for 20 years at an interest rate of 7% per year. Up to how much could you withdraw yearly in this case and still meet your goal? In other words, what is the value of d in the annuity formula in this case?

3. Why is the value you found in part 2 larger than $50,000? Where is the extra money coming from?

4. Suppose you want to keep your withdrawal at $50,000 per year. At the same 7% interest per year, what starting principal would you need if you want to run out of money in the account after 20 years?

5. Discuss the reasons you might want to start your retirement with a higher principal than the one found in part 4.