

MATH 1070Q

Section F.3: Annuities and Sinking Funds

Myron Minn-Thu-Aye

University of Connecticut

Objectives

- ① Understand what annuities and sinking funds are.
- ② Know the future value formula for annuities and use it to answer questions.

Annuities

So far, we have talked about investing a single amount of money at one time, and letting it grow. What if we add equal payments at equal time periods—these payments are called **annuities**.

Suppose we invest \$500 in an account each year with an annual rate of 6% compounded annually. What is the total value after 10 years?

PMT = amount of each payment

n = total number of payments = mt

i = periodic interest rate = $\frac{r}{m}$

$$\text{future value} = \text{FV} = \text{PMT} \times \frac{(1 + i)^n - 1}{i}$$

$$\text{In our example, } \text{FV} = 500 \times \frac{(1 + \frac{0.06}{1})^{1(10)} - 1}{\frac{0.06}{1}} = 6590.40 \text{ (2 dec plc)}$$

More annuities

Find the future value of annuities of \$370 deposited each quarter into an account with an annual rate of 7.2% compounded quarterly after 9 years.

Sinking funds

A sinking fund is where we pay annuities to reach a certain goal. Since our money will earn interest over time, we don't need to provide the entire amount ourselves (the difference will be made up via interest).

If we need to accumulate \$1,000,000 in an account with an annual rate of 5.5% compounded monthly after 25 years, how much should our monthly deposit be?

Recap

- 1 Annuities are equal payments made at equal time intervals. Older payments will earn more interest than newer ones.
- 2 The future value of annuities can be found using the formula

$$FV = PMT \times \frac{(1 + i)^n - 1}{i}$$

- 3 We can take the above formula and solve for PMT to find the periodic payments required to reach the goal of a sinking fund.