CHAPTER 5 PROJECT

Comparing Financial Products at a Campus Credit Union

You are interning at a campus credit union that serves students, faculty, and staff. The credit union is updating its marketing materials and requires an analysis of its savings products, loan options, and retirement planning tools. You will use simple and compound interest, annuity formulas (present and future value), and loan amortization to compare products and advise clients. All rates and terms in this project reflect realistic but simplified versions of current financial products.

1. A faculty member deposits \$10,000 into a simple interest account paying 4.5% annually. Calculate the interest earned and the total balance after 3 years. Then calculate the balance if the same deposit was placed in an account paying 4.5% compounded annually for 3 years. What is the dollar difference between the two, and what accounts for this difference?

2. The credit union offers a 2-year CD at 5.1% compounded monthly. A staff member deposits \$15,000. Calculate the future value using $A = P\left(1+\frac{r}{n}\right)^{nt}$. What is the annual percentage yield (APY)? Show the formula and calculation.

3. A graduating senior plans to start saving for a down payment on a house. She will deposit \$250 at the end of each month into an account earning 4.8% compounded monthly. Use the future value of an ordinary annuity formula to determine how much she will have after 5 years. How much of the total consists of her own deposits, and how much is earned interest?

4. The credit union's financial advisor recommends that a 22-year-old staff member begin contributing \$150 per month to a retirement fund earning 7% compounded monthly. Calculate the future value at age 65 (43 years of contributions). Then calculate the future value if the same person waits until age 32 and contributes \$250 per month for 33 years at the same rate. Which strategy produces more, and by how much?

5. A student takes out a $22,000 auto loan at 6.9% APR compounded monthly for 5 years (60 months). Use the loan payment formula $PMT = P \cdot \left[\dfrac{\frac{r}{n}}{\left(1 - \left(1 + \frac{r}{n}\right)^{-nt}\right)} \right]$ to calculate the monthly payment. What is the total amount paid over the life of the loan? How much total interest does the student pay?

6. The same student from Question 5 considers two loan options:

Option A: $22,000 at 6.9% for 60 months

Option B: $22,000 at 5.4% for 48 months

Calculate the monthly payment for Option B. Compare total interest paid under each option. Which loan costs less overall, and which option has the lower monthly payment? Why might a borrower still choose the option with higher total interest?

7. A local nonprofit wants to establish a scholarship that pays out $2,000 per year indefinitely. The credit union offers an account earning 5.2% compounded annually. How much must the nonprofit deposit today to fund this perpetuity? If the nonprofit can only deposit $30,000, what annual scholarship amount can it sustain?

8. The credit union is offering a special promotion: a 3-year savings account at 4.6% compounded quarterly, or a 3-year account at 4.5% compounded daily (365 times per year). For a $20,000 deposit, calculate the future value under each option. Which is the better deal? Calculate the APY for each to confirm.

9. A 30-year-old member wants to accumulate \$500,000 by age 60 in a retirement account earning 6.5% compounded monthly. She plans to make equal monthly deposits.

a. Use the future value annuity formula to determine the required monthly deposit.

b. If she delays starting until age 40 (20 years of deposits instead of 30), what monthly deposit is needed?

c. How much more per month must she contribute due to the 10-year delay? What does this tell you about the financial value of starting early?

10. The credit union's marketing team drafts the slogan: 'Start saving today — even \$50 a month can make you a millionaire!' Evaluate this claim. Assuming \$50/month at 7% compounded monthly, how many years would it take to reach \$1,000,000? Show the setup and solve using logarithms. Is the slogan technically accurate? Is it realistic for the credit union's typical clients? What important assumptions does it rely on, and what could cause the actual outcome to fall short?