Module 3 Exercise: Personal Financing and Investing

In this week, we've learned a valuable tool called the time value of money (TVM) calculation. TVM is widely used in real-world situations for personal finance, business, and public sector analysis in situations involving future cash flows. Often, we use TVM to calculate payments for a loan, mortgage, or debt, and we also use it to figure out how much monthly investment is needed to reach goals such as education, retirement, or vacations.

In this exercise, you are going to practice TVM by working through two applications. First, you will calculate the payment plan for a possible loan or mortgage. Second, you will design an investing plan for a future goal. In both parts, you will experiment with different assumptions to see how interest rates and time horizons affect your results.

Two workbooks posted with this module will save you time. `Examples of TVM.xlsx` has a worked sheet for each Excel function, including `Calculate PMT` and `Calculate FV with PMT`. `Bond&Mortgage examples.xlsx` has a `Mortgage` sheet you can adapt directly.

Financing

Financing is about using borrowing to fund a purchase that you need now and paying it back later with future income. Borrowing can be in the form of a mortgage or loan. Typically, you will make a down payment, and then pay a fixed monthly amount over a certain period of time. For example, a home mortgage often lasts 30 years with a down payment of 10–20% of the purchase price; a car loan usually lasts 5 years with a down payment of $3,000–$5,000; a student loan may last 10–20 years depending on the program.

Pick one financing tool. It can be your student loan, your car loan, or your mortgage. If you don't currently have a loan, you can assume a new purchase such as a house, a car, or a home improvement you want to do in the near future. Then calculate the payment under several assumptions. This is the opportunity to practice using TVM and think about whether you can afford the new borrowing. Try to use realistic numbers to help yourself plan.

Step 1: Decide the loan amount. If you have a current debt, look up the remaining balance. If you want to make a new purchase, look up the current market price of the house or the car (or other items).

Step 2: Decide how much cash you can put aside as a down payment. For existing debt, enter 0. For a new purchase, think about how much you can realistically pay upfront.

Step 3: Decide the interest rate. You can look up current mortgage, student loan, or car loan rates online, or ask a generative AI tool. If you cannot find a rate, assume 7%/year. Recall that because you are going to make monthly payments, you need to calculate the monthly rate, which is the yearly rate divided by 12.

Step 4: Decide the repayment period. If this is a current loan, use the remaining term. If this is new borrowing, assume 30 years (360 months) for a mortgage and 5 years (60 months) for a car loan.

Step 5: Use TVM to calculate the monthly payments under the following scenarios:

- The current market interest rate.
- If the market rate decreases to 4%.
- If you increase your down payment (assume an amount).

After you calculate the payments, compare them to your monthly budget from Module 1. Do they fit within your budget?

Use generative AI to check your answers and to explore questions such as:

- "If I further change my down payment, how does my monthly payment change?"
- "If the interest rate change to higher/lower, what would the new payment be?"
- "Given my monthly budget, can I afford this loan?"

Investing

Investing is about putting aside money now so that it can grow into future income. People invest for many purposes: to build retirement income through 401(k) or IRA accounts, to save for a child's education through 529 plans, or to generate extra income for vacations and other big purchases.

In this exercise, you will pick a goal you want to invest for. It could be retirement, a child's education, a vacation, or simply extra savings. Then you will use TVM analysis to calculate how much you need to save every month to reach that goal.

Step 1: Pick an investment goal. Decide how much you will need and in how many years. For a vacation, estimate the total cost. For a 529 plan, estimate tuition costs. For retirement, think about your target savings goal.

Step 2: Choose an investment tool. Examples include a bank savings account, a mutual fund, or a retirement plan. Look up the interest or return rate you can expect. If you are unsure, ask a generative AI tool to suggest typical returns for different investment tools. Recall that the yearly return rate should be divided by 12 to get the monthly return rate, because you are investing monthly.

Step 3: Use TVM to calculate how much you need to save each month to reach your goal.

Step 4: Consider an alternative investment with a higher return. How would this affect your monthly savings? What if you invest for a longer period of time? What if you put in more monthly savings?

Use generative AI to check your answers and explore different scenarios. Ask questions like:

- "How can I further increase my investment returns?"
- "What risks are associated with my investment options?"
- "Can I afford to keep this investment within my budget?"

What to Submit

Privacy Note: You do not need to disclose your actual balances, income, or account details, and you should not paste them into an AI tool. Describe the loan or the investment in general terms — "a car loan of roughly $20,000 over five years" is enough — and round or scale any figure you would rather not share. What is being graded is the TVM analysis and your reasoning, not your personal finances.

Prepare one 1-page document that includes both parts of the exercise and respond to the following questions.

Financing:

Briefly describe the loan or mortgage you analyzed (real or assumed).

Summarize your TVM results across the scenarios in Step 5.

Considering your budget and AI feedback, is this loan affordable for you? What changes would you need to make, if any?

Investing:

Briefly describe your investment goal, including the target amount and time horizon.

Summarize your TVM results across the scenarios in Step 4.

Based on your analysis and AI feedback, is your savings plan realistic? What adjustments might you need to make?

AI-use disclosure: At the end of your document, note which tool you used and one suggestion it gave you that you decided *not* to follow, and why. Catching something the tool got wrong is a strong answer, not a weak one.