

Time Value of Money Practice Problems

Dr. Stanley D. Longhofer

- 1) Jim makes a deposit of \$12,000 in a bank account. The deposit is to earn interest annually at the rate of 9 percent for seven years.
 - a) How much will Jim have on deposit at the end of seven years?
 - b) Assuming the deposit earned a 9 percent rate of interest compounded quarterly, how much would he have at the end of seven years?
 - c) In comparing parts (a) and (b), what are the respective effective annual yields? Which alternative is better?
- 2) John is considering the purchase of a lot. He can buy the lot today and expects the price to rise to \$15,000 at the end of 10 years. He believes that he should earn an investment yield of 10 percent annually on this investment. The asking price for the lot is \$7,000. Should he buy it? What is the annual yield (internal rate of return) of the investment if John purchases the property for \$7,000 and is able to sell it 10 years later for \$15,000?
- 3) An investor can make an investment in a real estate development and receive an expected cash return of \$45,000 after six years. Based on a careful study of other investment alternatives, she believes that an 18 percent annual return compounded quarterly is a reasonable return to earn on this investment. How much should she pay for it today?
- 4) Suppose you have the opportunity to make an investment in a real estate venture that expects to pay investors \$750 at the end of each month for the next eight years. You believe that a reasonable return on your investment should be 17 percent compounded monthly.
 - a) How much should you pay for the investment?
 - b) What will be the total sum of cash you will receive over the next eight years?
 - c) Why is there such a large difference between (a) and (b)?
- 5) Walt is evaluating an investment that will provide the following returns at the end of each of the following years: year 1, \$12,500; year 2, \$10,000; year 3, \$7,500; year 4, \$5,000; year 5, \$2,500; year 6, \$0; and year 7, \$12,500. Walt believes that he should earn an annual rate of 9 percent on this investment. How much should he pay for this investment?
- 6) A loan of \$50,000 is due 10 years from today. The borrower wants to make annual payments at the end of each year into a sinking fund that will earn interest at an annual rate of 10 percent. What will the annual payments have to be?

Suppose that the borrower will make monthly payments that earn 10 percent interest, compounded monthly. How much will he pay annually into the fund?

- 7) The Dallas Development Corporation is considering the purchase of an apartment project for \$100,000. They estimate that they will receive \$15,000 at the end of each year for the next 10 years. At the end of the 10th year, the apartment project will be worth nothing. If Dallas purchases the project, what will be its internal rate of return? If the company insists on a 9 percent return compounded annually on its investment, is this a good investment?
- 8) Suppose you deposit \$5,000 into an account earning 4 percent interest, compounded monthly.
 - a) How many years will it take for your account to be worth \$7,500?
 - b) Suppose in addition to the initial \$5,000 deposit, you will make monthly contributions of \$50. How many years will it take for the account to grow to \$7,500 in this case?
 - c) How does your answer change if you make quarterly deposits of \$150 rather than monthly contributions of \$50? Explain the reason for any difference in your answer from part b. Maintain the assumption that interest compounds monthly.
- 9) Consider an investment that will pay \$680 per month for the next 15 years and will be worth \$28,000 at the end of that time. How much is this investment worth to you today at a 5.25 percent discount rate?
- 10) You currently owe \$18,000 on a car loan at 9.5 percent interest. If you make monthly payments of \$576.59 per month, how long will it take you to fully repay the loan?
- 11) You have just borrowed \$10,000 and will be required to make monthly payments of \$227.53 for the next five years in order to fully repay the loan. What is the implicit interest rate on this loan?
- 12) Your uncle has given you a bond that will pay \$500 at the end of each year forever into the future. If the market yield on this bond is 8.25 percent, how much is it worth today?
- 13) Suppose you have an investment that is expected to generate a \$20,000 cash flow next year and that this is expected to increase by 5 percent per year forever into the future.
 - a) If your required rate of return on this investment is 18 percent, how much is it worth to you today?
 - b) Suppose now that you do not know how fast the cash flows will grow in the future, but that you expect them to grow at a constant rate. Suppose also that this investment is currently priced at \$200,000. If the required rate of return is still 18 percent, how fast does the market expect the annual cash flows to grow?
- 14) You are considering the purchase of an investment that is expected to generate cash flows of \$15,000 per year for the next five years. After that, cash flows are expected to increase at the rate of 5 percent per year for the indefinite future. Thus, in year 6 the cash flow will be \$15,750, etc. How much is this investment worth to you today if your required return is 15 percent?

_____ 1. What is the future value of \$3,500 deposited for 12 years at 5 percent interest, compounded annually?
A. \$6,285.50
B. \$3,679.07
C. \$55,709.94
D. \$6,369.47

_____ 2. What is the internal rate of return on an investment that costs \$2,000 and returns \$32 per month for the next 15 years?
A. The IRR cannot be calculated for this investment
B. 1.48%
C. 17.86%
D. 14.13%

_____ 3. What is the internal rate of return of an investment with the following cash flows?

n	\$
0	(1,000)
1	300
2	300
3	300
4	200
5	100

- A. The IRR cannot be calculated for this investment
B. 10.00%
C. 15.23%
D. 7.48%

_____ 4. If your discount rate is 12%, what is the NPV of the investment from the last question?
A. \$0.00
B. (\$55.25)
C. \$200.00
D. (\$95.60)

_____ 5. True or False: Assuming the same positive discount rate and the same number of years over which they will be received, a \$1,200 annuity with annual payments has a larger present value than a \$100 annuity with monthly payments.

- _____ 6. How much should you pay for an investment that pays \$1,500 per year for the next three years and then \$2,000 per year for the following two years? Assume a discount rate of 15% per year?
- A. \$8,500.00
 - B. \$5,562.70
 - C. \$6,338.15
 - D. \$10,000.00
- _____ 7. Consider an eight-year investment costing \$55,000. It is expected to pay \$3,000 per year in each of the next five years and \$15,000 per year in the last three years. If the required discount rate is 12 percent, what is the net present value of this investment?
- A. \$86,257.28
 - B. (\$23,742.72)
 - C. \$5,000
 - D. \$60,000.00
- _____ 8. What is the internal rate of return of the investment in the last question?
- A. The IRR cannot be calculated for this investment
 - B. 1.47%
 - C. 14.7%
 - D. 12.0%
- _____ 9. What is the annual debt service on a \$1.2 million 30-year mortgage at 6.75% interest with monthly payments?
- A. \$40,518
 - B. \$7,783
 - C. \$94,286.59
 - D. \$93,398
- _____ 10. In class we said that “cash is king” in finance. Which of the following things is NOT true about this king?
- A. More is better than less
 - B. Sooner is better than later
 - C. Certain is better than uncertain
 - D. Straight is better than crooked