

## 3.25 Problems

The numbers in parentheses ( ) that follow these problems indicate the section from which each problem is taken. (Refer to Appendix G of this book for answers to even-numbered problems.)

**3-1.** What lump-sum amount of interest will be paid on a \$10,000 loan that was made on August 1, 1996, and repaid on November 1, 1999, with ordinary simple interest at 10% per year? (3.4)

**3-2.** Draw a cash flow diagram for \$10,500 being loaned out at an interest rate of 12% per year over a period of six years. How much simple interest would be repaid as a lump-sum amount at the end of the sixth year? (3.4, 3.7)

**3-3.** What is the future equivalent of \$1,000 invested at 6% simple interest per year for  $2\frac{1}{2}$  years? (3.4)

- a. \$1,157      b. \$1,188      c. \$1,184  
d. \$1,175      e. \$1,150

**3-4.** How much interest is payable each year on a loan of \$2,000 if the interest rate is 10% per year when half of the loan principal will be repaid as a lump sum at the end of four years and the other half will be repaid in one lump-sum amount at the end of eight years? How much interest will be paid over the eight-year period? (3.6)

**3-5.** In Problem 3-4, if the interest had not been paid each year but had been added to the outstanding principal plus accumulated interest, how much interest would be due to the lender as a lump

sum at the end of the eighth year? How much extra interest is being paid here (as compared to Problem 3-4) and what is the reason for the difference? (3.6)

**3-6.**

a. Suppose that in Plan 1 of Table 3-1, \$4,000 in principal is to be repaid at the end of years two and four only. How much total interest would have been paid by the end of year four? (3.6)

b. Rework Plan 3 of Table 3-1 when an annual interest rate of 8% is being charged on the loan. How much principal is now being repaid in the third year's total end-of-year payment? How much total interest has been paid by the end of the fourth year? (3.6, 3.9)

**3-7.**

a. Based on the information, determine the value of each "?" in the table below. (3.6)

Loan Principal = \$10,000

Interest Rate = 6%/yr.

Duration of Loan = 3 yrs.

EOY <i>k</i>	Interest Paid	Principal Repayment
1	\$600	?
2	\$411.54	\$3,329.46
3	?	?

- b. What is the amount of principal owed at the beginning of year three?
- c. Why is the total interest paid in (a) different from  $\$10,000(1.06)^3 - \$10,000 = \$1,910$  that would be repaid according to plan 4 in Table 3-1?

**3-8.** Compute the value of  $P_0$  for each of the two alternatives discussed in Example 3-2. The annual interest rate is 10%. Which alternative should be selected, assuming that doing nothing is not an option? (3.9, 3.12)

**3-9.** What amount would need to be paid each January 1 into a savings account if at the end of 15 years (15 payments) you desired \$10,000? Annual interest is 7%. (Note: The last payment will coincide with the time of the \$10,000 balance.) (3.9)

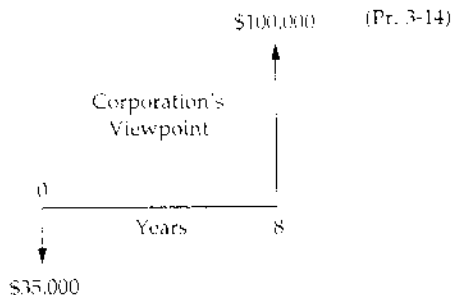
**3-10.** A future amount,  $F$ , is equivalent to \$1,500 now when six years separate the amounts and the annual interest rate is 12%. What is the value of  $F$ ? (3.8)

**3-11.** A present obligation of \$20,000 is to be repaid in equal uniform annual amounts, each of which includes repayment of the debt (principal) and interest on the debt, over a period of five years. If the interest rate is 10% per year, what is the amount of the annual repayment? (3.9)

**3-12.** Suppose that the \$20,000 in Problem 3-11 is to be repaid at a rate of \$4,000 per year plus the interest that is owed based on the beginning-of-year unpaid principal. Compute the total amount of interest repaid in this situation and compare it with that of Problem 3-11. Why are the two amounts different? (3.6)

**3-13.** A person wishes to accumulate \$2,500 over a period of 15 years so that a cash payment can be made for a new roof on a summer cottage. To have this amount when it is needed, annual payments will be made into a savings account that earns 8% interest per year. How much must each annual payment be? Draw a cash flow diagram. (3.7, 3.9)

**3-14.** You have just learned that ABC Corporation has an investment opportunity that costs \$35,000 and eight years later pays a lump-sum amount of \$100,000. The cash flow diagram follows.



What interest rate per year would be earned on this investment? Calculate your answer to the nearest one-tenth of 1%. (3.8)

**3-15.** It is estimated that a copper mine will produce 10,000 tons of ore during the coming year. Production is expected to increase by 5% per year thereafter in each of the following six years. Profit per ton will be \$14 for years one through seven.

- Draw a cash flow diagram for this copper mine operation from the company's viewpoint. (3.7)
- If the company can earn 10% per year on its capital, what is the future equivalent of the copper mine's cash flows at the end of year seven? (3.8 or 3.14)

**3-16.** Mrs. Green has just purchased a new car for \$12,000. She makes a down payment of 30% of the negotiated price and then makes payments of \$303.68 per month thereafter for 36 months. Furthermore, she believes the car can be sold for \$3,500 at the end of three years. Draw a cash flow diagram of this situation from Mrs. Green's viewpoint. (3.7)

**3-17.** If \$25,000 is deposited now into a savings account that earns 8% per year, what uniform annual amount could be withdrawn at the end of each year for ten years so that nothing would be left in the account after the tenth withdrawal? (3.9)

**3-18.** It is estimated that a certain piece of equipment can save \$6,000 per year in labor and materials costs. The equipment has an expected life of five years and no salvage value. If the company must earn a 15% annual return on such investments, how much could be justified now for the purchase of this piece of equipment?