

- 1) You are charged with buying DVDs for a movie rental store. The owner would like to buy three categories of movies: new releases, horror, and westerns. You are given a budget of \$5600 and instructed to buy 1000 DVDs. The owner says that she would like you to buy three times as many horror movies as westerns. You find a supplier that will sell new releases in bulk for \$7 per DVD, horror movies for \$4 per DVD, and westerns for \$2 per DVD.

a) Define the variables.

$$x =$$

$$y =$$

$$z =$$

b) Set up the system of equations required to solve the problem. **Do not solve the system.**

c) Write the matrix that corresponds to the system of equations from part b). **Do not reduce the matrix.**

- 2) Tom borrowed \$2,000 from his father and agreed to pay a simple interest rate of 5.5%. After some time had passed, he paid his father \$2,302.50. How long did it take Tom to pay back the loan, including interest?
- 3) Harold will receive a \$3000 income tax refund. For a \$40 fee, her accountant gives her an "interest free" loan for the refund amount. The loan will be due in four weeks. If Harold views the fee as simple interest, what is the simple interest rate of the loan?
- 4) When I was considering what to do with the \$10,000 proceeds from my sale of technology stock, my broker suggested I invest half of it in municipal bonds, whose value was growing by 6% per

year, and the other half in CDs, which were yielding 2% per year, compounded every 2 months. Assuming these rates are sustained, how much will my investment be worth in 15 years? (Round your answer to the nearest cent.)

- 5) Determine the amount of money, to the nearest dollar, that you must invest at 9% interest per year, compounded monthly, so that you become a millionaire in 28 years.
- 6) Your pension plan is an annuity with a guaranteed return of 4.5% per year, compounded monthly. You would like to retire with a pension of \$4,000 per month for 25 years. If you work for 30 years before retiring, how much must you and your employer deposit each month into the fund?
- 7) Sara just received an inheritance worth \$900,000. She decides on an annuity that give her monthly payments for the next 15 years. The annuity earns 5.2% interest, compounded monthly. How much will the payments need to be so that the \$900,000 draws down to zero after 15 years? (Round your answer to the nearest cent.)
- 8) You want to set up an education account for your child and would like to have \$75,000 after 17 years. You find an account that pays 5.2% interest, compounded semiannually, and you would like to deposit money in the account every six months. How large must each deposit be in order to reach your goal? Round to the nearest dollar.
- 9) Find the present value PV of the annuity necessary to fund withdrawals of \$100 per month for 20 years, if the annuity earns 2% per year (assume monthly compounding).
- 10) Solve the system of equations without using a calculator. Show all of your work.

$$x + y + 6z = 4$$

$$x - y + 2z = 2$$

$$x + 2z = 0$$