1) A manufacturer sells car batteries for $150 each. The company's fixed costs are $45,000 per month, and marginal costs are $55 per battery.

   a) Write the equations for the revenue, cost, and profit functions. Let x be the number of batteries.

   $R(x) =$

   $C(x) =$

   $P(x) =$

   b) How many batteries must be sold to break even? Round to the nearest battery.

2) Let $f(x) = 2x^2 - 3x + 1$

   a) Calculate $f(-3)$ b) Calculate $f(2) - f(-2)$

   a) Find and simplify $f(x + h)$ d) Find and simplify $\frac{f(x+h)-f(x)}{h}$

3) The XYZ Widget factory can produce 80 widgets in a day at a total cost of $8,000 and it can produce 100 widgets a day at a total cost of $10,000.
   a) What are the company's daily fixed costs and marginal cost per widget?
   b) Use the cost function to estimate the cost of manufacturing 400 widgets in a day.

4) You can sell 100 pet rocks per week if they are marked at $1 each, but only 40 each week if they are marked at $2 per rock. Your rock supplier is prepared to sell you 30 rocks each week if they are marked at $1/rock, and 120 each week if they are marked at $2 per rock.

   a) Write down the associated linear demand and supply functions.

   b) At what price should the rocks be marked so that there is neither a surplus nor a shortage of rocks?

5) The demand function for a specific product is given by $q = -2p + 360$ units, where p is the price per unit.

   a) Find the revenue function $R(p)$.

   b) Find the price that maximizes the revenue.

   c) Find the maximum revenue.

   d) How many units must be produced to maximize the revenue?

6) The half-life of cobalt 60 is 5 years.

   a) Obtain an exponential model for cobalt 60 in the form $Q(t) = Q_0 e^{-kt}$. (Round coefficients to three significant digits.)

   b) Use your model to predict, to the nearest year, the time it takes for one third of the sample of cobalt 60 to decay.

7) A bacteria culture starts with 2,500 bacteria at time $t = 0$. Two hours later there are 13,500 bacteria. Round your values to two decimal places as necessary.

   a) Find an exponential model for the size of the culture as a function of time t in hours.

   b) Use the model to predict how many bacteria there will be after 3 hours.

8) 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?

9) 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?

10) 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.)

11) You want to set up an education account for your child and would like to have $75,000 after 15 years. You find an account that pays 5.6% 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.

12) Solve the system of equations without using a calculator. Show all of your work.

$$x + y + 6z = 4$$
$$x - y + 2z = 2$$
$$x \quad\quad + 2z = 0$$

13) Let $A = \{2, 5, 8, z, \$\}$, $B = \{5, \uparrow, z, 8, p\}$, and $C = \{2, z, 9, p, \Delta\}$. Find the following:

   a) $A \cup (B \cap C)$

   b) $(A \cup B) \cap C$

   c) $A \cap (B \cup C)$

d) $A \cap (B \cap C)$

e) Draw a Venn diagram that shows the relationships between A, B, and C.

f) Find $n(A \times B)$

14) Use the given information to complete the solution of the partially solved Venn Diagram.
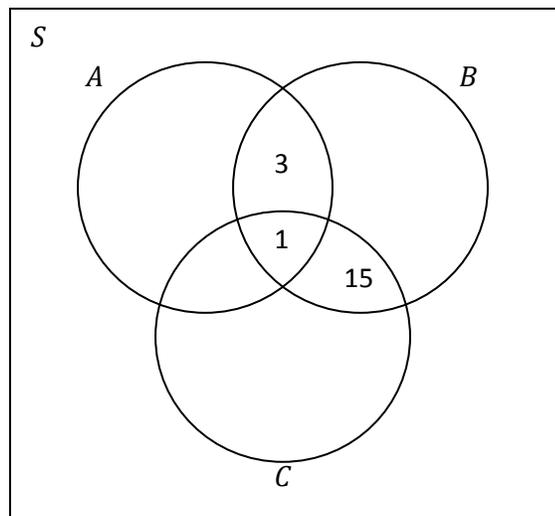
$$n(A) = 30, n(B) = 25, n(C) = 33,$$
$$n(A \cap C) = 10, n(S) = 60$$

15) A test requires that you answer first Part A and then either Part B or Part C. Part A consists of seven true-false questions, Part B consists of three multiple-choice questions with one correct answer out of five, and Part C consists of three questions with one correct answer out of four. How many different completed answer sheets are possible?

16) The following table shows the results of a survey of 200 authors by a publishing company.

	New Authors	Established Authors	Total
Successful	16	44	60
Unsuccessful	38	102	140
Total	54	146	200

Compute the relative frequency of the following events.

a) An author is successful and new.

b) An author is a new author.

c) A successful author is established.

d) An established author is successful.

e) An unsuccessful author is new.

17) Suzan has a bag containing four red marbles, three green ones, two white ones, and one purple one. She grabs five of them. Find the probability of the following events, expressing each as a fraction in lowest terms.

a) She has none of the red ones.

b) She has at least one white one.

c) She has at most one green one.

d) She has two green ones and one of each of the other colors.

e) She has all the red ones.

In addition to these problems, you should also look again at the homework problems, quizzes, and the worksheets.