1. A company will not produce any gym shoes for less than $120 a pair. For $145 a pair, they are willing to make 600 pairs of shoes. Find the linear supply function. If the price-demand function is given by \( y = -0.5x + 250 \), find and discuss the equilibrium price and quantity for the shoes.

2. Jeff’s inbox currently has 98 unread e-mails, and this number is decreasing by 5 per day. Model the number of e-mails as a function of time, measured in days.

3. A company that prints paperback mystery novels has fixed costs of $3600 per month, and $3.50 for each novel printed. Give the linear cost \( C(x) \) as a function of the number \( x \) of novels printed. The company sells the paperbacks to a retailer for $6.50 each. Give the linear revenue function \( R(x) \). Find and discuss the break-even point.

4. A gadget manufacturer has cost function given by \( C(x) = 0.02x^2 + 7.5x + 600 \) dollars, and sells the gadgets for $20 each. Find the revenue function and the break-even point.

5. Danny has to replace a piece of equipment in his shop. He can buy an Alpha machine that costs $125,820 and takes $83 dollars to maintain each week, or he can buy a Beta machine that costs $87,500 and takes $163 dollars to maintain each week. How many weeks will it take for the choice of the Alpha machine to be less expensive than that of the Beta machine?
6. Determine the value of $k$ for which the following system has
   (a) infinitely many solutions
   (b) no solution.
   \[
   \begin{align*}
   2x + (2k - 5)y &= 3 \\
   6x - 3y &= 9
   \end{align*}
   \]

7. Kathy invested $73,500 in three different accounts. The annual yield on each of the three accounts was 4%, 5.5%, and 6%. The amount of money in the 4% account was four times the amount of money in the 5.5% account. If at the end of the year she had made $3,900 in interest, how much had she placed in each account?

8. The Jones’ family has three birthday party celebrations this month. For Abe’s party they need 18 cupcakes, 3 bottles of juice and 12 party favors. For Ben’s party they need 21 cupcakes, 4 bottles of juice and 16 party favors. For Charlie they need 26 cupcakes, 5 bottle of juice and 20 party favors. Each cupcake costs $1.75, each bottle of juice $4.75 and each party favor $7.30. Set up two matrices whose product shows how much the Jones’ family will spend for each party as far as cupcakes, juice and party favors.