Problem 1. The price $V(t)$ in dollars of EBAY stock during the 10-week period starting July 1, 2004 can be approximated by the following function of time $t$ in weeks ($t = 0$ represents July 1):

$$V(t) = \begin{cases} 
90 - 4t & \text{if } 0 \leq t \leq 5 \\
60 + 2t & \text{if } 5 < t \leq 20 
\end{cases}$$

What was the approximate price of EBAY stock after 1 week, after 5 weeks, and after 10 weeks?

Problem 2. Consider the following function:

$$f(x) = \begin{cases} 
-2 & \text{if } -3 \leq x < -1 \\
x & \text{if } -1 \leq x \leq 1 \\
x^2 - 1 & \text{if } 1 < x \leq 2 
\end{cases}$$

a. Evaluate $f(-3), f(-1), f(0), f(1)$, and $f(2)$.

b. Find the domain of $f$.

c. Sketch the graph of $f$.

Problem 3. Find equations for the following straight lines.

a. Through the points (1, 2) and (3, -1)

b. Through (2, -2) and parallel to the line $3x + 4y = 5$

c. Horizontal and through (-9, 5)

d. Vertical and through (-9, 5)

Problem 4. The manager of the FrozenAir Refrigerator factory notices that on Monday it cost the company a total of $25,000 to build 30 refrigerators and on Tuesday it cost $30,000 to build 40 refrigerators.

a. Find a linear cost function based on this information. What is the daily fixed cost, and what is the marginal cost?

b. FrozenAir sells its refrigerators for $1500 each. What is the revenue function?

c. What is the profit function? How many refrigerators must FrozenAir sell in a day in order to break even for that day? What will happen if it sells fewer refrigerators? If it sells more?

Problem 5. The following chart shows weekly sales figures (the demand) for Hot’n’Spicy at two different prices, as well as the number of cans per week that you are prepared to place on sale (the supply) at these prices.

<table>
<thead>
<tr>
<th>Price/Can</th>
<th>$0.50</th>
<th>$0.75</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand (cans sold/week)</td>
<td>400</td>
<td>350</td>
</tr>
<tr>
<td>Supply (cans placed on sale/week)</td>
<td>300</td>
<td>500</td>
</tr>
</tbody>
</table>

a. Model these data with linear demand and supply functions.

b. How much should you charge per can of Hot’n’Spicy beans if you want the demand to equal the supply? How many cans will you sell at that price, known as
the equilibrium price? What happens if you charge more than the equilibrium price? What happens if you charge less?

**Problem 6.** Following are forecasts of worldwide annual cell phone handset sales:

<table>
<thead>
<tr>
<th>Year x</th>
<th>3</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales y (Millions)</td>
<td>500</td>
<td>600</td>
<td>800</td>
</tr>
</tbody>
</table>

(x = 3 represents 2003). Complete the following table and obtain the associated regression line. (Round coefficients to 2 decimal places.)

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>xy</th>
<th>x^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>800</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Totals | |
|--------| |

Use your regression equation to project the 2008 sales.

**Problem 7.** Gerber Mixed Cereal for Baby contains, in each serving, 60 calories and 11 grams of carbohydrates. Gerber Mango Tropical Fruit Dessert contains, in each serving, 80 calories and 21 grams of carbohydrates. If you want to provide your child with 200 calories and 43 grams of carbohydrates, how many servings of each should you use?

**Problem 8.** Use Gauss elimination or Gauss-Jordan elimination to solve the following system of linear equations:

\[
\begin{align*}
  x + y + 6z &= -1 \\
  x - y + 2z &= 1 \\
  x + z &= 0
\end{align*}
\]

**Problem 9.** An airline is considering the purchase of aircraft to meet an estimated demand for 3200 seats. The airline has decided to buy Boeing 747s, which seat 400 passengers and are priced at $200 million each; Boeing 777s, which seat 300 passengers and are priced at $160 million; and Airbus A330s, which seat 300 passengers and are priced at $120 million. Assuming that the airline wishes to buy three times as many 777s as 747s, how many of each should it order to meet the demand for seats, given a $1600 million spending target?