Section 1.1

20. Begin by setting up equations. The total demand for the product of Industry A is 1000 (from consumbers) plus $0.1b$ (from Industry B), so that the output a must satisfy $a = 1000 + 0.1b$. Setting up a similar equation for b from the demand for the product of Industry B, we obtain the system
$$\begin{vmatrix} a & - & 0.1b & = & 1000 \\ -0.2a & + & b & = & 780 \end{vmatrix},$$
which yields the unique solution $a = 1100$, $b = 1000$.

29. **Hint:** In order to come up with equations, think what it means for the points to lie on the graph. For example, $(1, -1)$ lies on the graph, so $f(1) = -1$. That is, $a + b(1) + c(1^2) = -1$, or $a + b + c = -1$. Use the other points to find two other equations, then solve.

Section 1.2

4. $x = 2$, $y = -1$.

18. (b) and (d) are in rref. (a) isn't since the third column contains two leading ones. (c) isn't since the third row contains a leading one, but the second row does not.

Section 1.3

4. This matrix has rref $\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix}$, so it has rank 2.

34. (a) $A\vec{e_1} = \begin{bmatrix} a \\ d \\ g \end{bmatrix}$,

$A\vec{e_2} = \begin{bmatrix} b \\ e \\ h \end{bmatrix}$,

$A\vec{e_3} = \begin{bmatrix} c \\ f \\ k \end{bmatrix}$.

(b) $B\vec{e_1} = \vec{v_1}$, $B\vec{e_2} = \vec{v_2}$, $B\vec{e_3} = \vec{v_3}$.

36. Use #34 to see that $A = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$.