14. Solve by substitution method

1. $2x + 5y = 1$
2. $-x + 6y = 8$

Solve one of the equations for one variable (you choose).

Solving Eq. (2) for $x$:
3. $x = 6y - 8$

Substitute this expression for $x$ into Eq. (1):

$2(6y - 8) + 5y = 1$

Solve for $y$:
$12y - 16 + 5y = 1$
$17y = 1 + 16$
$y = 1$

Now solve for $x$ in Eq. (2) or (3):
$12 - 16 + 5y = 1$
$5y = 1 - 14$
$y = -2$

Eq. (3): $x = 6(-2) - 8$
$x = -2$

Solution set is: $\{(1, -2)\}$

26. Solve by addition method

1. $3x - 7y = 13$
2. $6x + 5y = 7$

Multiply Eq. (1) by $2$ (call the result Eq. (3))

3. $-6x + 14y = -26$

Now add Eq. (2) and (3):

4. $6x + 5y = 7$
$19y = -19$
$y = -1$

Sub this value into Eq. (1), (2) or (3)
(I chose Eq. (2))

5. $3x - 7(-1) - 13$
$3x = 6$
$x = 2$

Solution set is: $\{(2, -1)\}$

46. Let $x$ be the 1st number and $y$ be the 2nd.

1. $3x + 2y = 8$

The sum of 3 times 1st number and twice the 2nd is 8.

2. $2x - y = 3$

2nd number subtracted from twice the 1st results in 3.

Solve (2) for $y$:

3. $y = 2x - 3$

Sub into (1):

$3x + 2(2x - 3) = 8$

$x = 2$

Solution set is: $\{(2, 1)\}$
50. Let $x$ be the number of cards produced and sold.

(a) Cost function is:
$$C(x) = 30,000 + 0.02x$$
\[
\text{or } y = 30,000 + 0.02x
\]

(b) Revenue function is:
$$R(x) = 0.50x$$
\[
\text{or } y = 0.5x
\]

(c) Solve Eq. (1) and (2) as a system, for $x$. Remember, to break even:

\[
0.5x = 30,000 + 0.02x \\
0.5x - 0.02x = 30,000 \\
0.48x = 30,000 \\
x = \frac{30,000}{0.48} = 62,500 \text{ cards}
\]
This is the number of cards you need to sell to break even.

58. Let $K = \#$ of calories in Kung Pao chicken
$M = \#$ of calories in a Big Mac

(1) $K + 2B = 2620$

(2) $2K + B = 3740$

(3) $K = 2620 - 2B$

\[
2(2620 - 2B) + B = 3740 \\
5240 - 4B + B = 3740 \\
-3B = -1500 \\
B = 500 \text{ calories}
\]

Sub. this value into Eq. (1), (2) or (3) (B is easiest!)

\[
K = 2620 - 2(500) \\
K = 1620 \text{ calories}
\]

Kung Pao chicken: 1620 cal
Big Mac: 500 cal

"Would you like fries with that?"