Math 214

Section 1.1

1A

$$x_1 - 3x_2 = 2 \quad (1)$$
$$2x_2 = 6 \quad (2)$$

From Equation 2 we get,

$2x_2 = 6$
$x_2 = 6/2$
$x_2 = 3$

We can now plug in that value,

$x_1 - 3(3) = 2$
$x_1 - 9 = 2$
$x_1 = 11$

Thus the final answer (s) are,
$x_1 = 11$
$x_2 = 3$

1B

$$x_1 + x_2 + x_3 = 8 \quad (1)$$
$$2x_2 + x_3 = 5 \quad (2)$$
$$3x_3 = 9 \quad (3)$$
$$(4)$$

From Equation 3 we get,

$3x_3 = 9$
$x_3 = 9/3$
$x_3 = 3$

We can now plug in $x_3 = 3$ into Equation 2

$2x_2 + 3 = 5$
$2x_2 = 2$
$x_2 = 1$

Plug in $x_3 = 3$ and $x_2 = 1$ into Equation 1,

$x_1 + 1 + 3 = 8$
$x_1 + 4 = 8$
$x_1 = 4$
Thus your final answer is,
$x_1 = 4$
$x_2 = 1$
$x_3 = 3$

1C

$$x_1 + 2x_2 + 2x_3 + x_4 = 5 \quad (1)$$
$$3x_2 + x_3 - 2x_4 = 4 \quad (2)$$
$$-x_3 + 2x_4 = -1 \quad (3)$$
$$4x_4 = 4 \quad (4)$$
$$(5)$$

From Equation 4 we get,

$4x_4 = 4$
$x_4 = 1$

We can now plug in $x_4 = 1$ into Equation 3

$-x_3 + 2(1) = -1$
$x_3 = 2 + 1$
$x_3 = 3$

Plug in $x_4 = 1$ and $x_3 = 3$ into Equation 2,

$3x_2 + 3 - 2(1) = 1$
$3x_2 + 1 = 1$
$3x_2 = 0$
$x_2 = 0$

Finally plug in $x_4 = 1$, $x_3 = 3$ and $x_2 = 0$ into Equation 1,

$x_1 + 2(0) + 2(3) + 1 = 5$
$x_1 + 0 + 6 + 1 = 5$
$x_1 + 7 = 5$
$x_1 = -2$

Thus your final results are,

$x_4 = 1$
$x_3 = 3$
$x_2 = 0$
$x_1 = -2$

1D

$$x_1 + x_2 + x_3 + x_4 + x_5 = 5 \quad (1)$$
$$2x_2 + x_3 - 2x_4 + x_5 = 1 \quad (2)$$
$$4x_3 + x_4 - 2x_5 = 1 \quad (3)$$
$$x_4 - 3x_5 = 0 \quad (4)$$
$$2x_5 = 2 \quad (5)$$
$$(6)$$

From Equation 5 we get,

$2x_5 = 2$
$x_5 = 1$

Plug in $x_5 = 1$ into Equation 4

$x_4 - 3(1) = 0$
$x_4 - 3 = 0$
$x_4 = 3$

Now, plug in $x_4 = 3$ and $x_5 = 1$ into Equation 3,

$4x_3 + 3 - 2(1) = 1$
$4x_3 + 1 = 1$
$4x_3 = 0$
$x_3 = 0$

With these, plug in $x_3 = 0$, $x_4 = 3$ and $x_5 = 1$ into Equation 2,

$2x_2 + 0 - 2(3) + 1 = 1$
$2x_2 - 5 = 1$
$2x_2 = 4$
$x_2 = 2$

Finally, plug in $x_2 = 2$, $x_3 = 0$, $x_4 = 3$ and $x_5 = 1$ into Equation 1,

$x_1 + 2 + 0 + 3 + 1 = 5$
$x_1 + 6 = 5$
$x_1 = -1$

Thus, your final answers are:

$x_1 = -1$
$x_2 = 2$
$x_3 = 0$
$x_4 = 3$
$x_5 = 1$

Coefficient Matrixes

2A

$$x_1 - 3x_2 = 2 \quad (1)$$
$$2x_2 = 6 \quad (2)$$

Thus the coefficient matrix would be,

$$\begin{pmatrix} 1 & -3 \\ 0 & 2 \end{pmatrix}$$

2B

$$x_1 + x_2 + x_3 = 8 \quad (1)$$
$$2x_2 + x_3 = 5 \quad (2)$$
$$3x_3 = 9 \quad (3)$$

Thus the coefficient matrix would be,

$$\begin{pmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{pmatrix}$$