Write the given system of equations as a matrix equation and solve by using inverses.

\[
\begin{align*}
2x_1 + x_2 &= k_1 \\
3x_1 + 2x_2 &= k_2
\end{align*}
\]

What are \(x_1\) and \(x_2\) when \(k_1 = 1\) and \(k_2 = 1\)?

**SOLUTION:**

The system written as a matrix equation is

\[
\begin{bmatrix}
2 & 1 \\
3 & 2
\end{bmatrix}
\begin{bmatrix}
x_1 \\
x_2
\end{bmatrix}
=
\begin{bmatrix}
k_1 \\
k_2
\end{bmatrix}.
\]

The inverse of
\[
\begin{bmatrix}
2 & 1 \\
3 & 2
\end{bmatrix}
\]

is
\[
\begin{bmatrix}
2 & -1 \\
-3 & 2
\end{bmatrix}.
\]

So then

\[
\begin{bmatrix}
2 & 1 \\
3 & 2
\end{bmatrix}
\begin{bmatrix}
x_1 \\
x_2
\end{bmatrix}
=
\begin{bmatrix}
k_1 \\
k_2
\end{bmatrix} \Rightarrow
\begin{bmatrix}
2 & -1 \\
-3 & 2
\end{bmatrix}
\begin{bmatrix}
x_1 \\
x_2
\end{bmatrix}
=
\begin{bmatrix}
2k_1 - k_2 \\
-3k_1 + 2k_2
\end{bmatrix}.
\]

This tells us that \(x_1 = 2k_1 - k_2\) and \(x_2 = -3k_1 + 2k_2\). When \(k_1 = 1\) and \(k_2 = 1\), then \(x_1 = 2(1) - 1 = 1\) and \(x_2 = -3(1) + 2(1) = -1\).

(Note that this is labeled as a partial example since the steps to find the inverse matrix were not shown.)