Based on fundamental insight,
\[ B^{-1} = \begin{pmatrix} 1 & 3 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & 0 \end{pmatrix} \]

Use the expressions in (a).
\[ A^\text{cur} = B^{-1} A^\text{in} = \begin{pmatrix} 1 & 3 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & 0 \end{pmatrix} \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix} = \begin{pmatrix} 5 \\ 5 \\ 4 \end{pmatrix} \]

\[ \begin{array}{cccccc|c}
X_1 & X_2 & X_3 & X_4 & X_5 & X_6 & \text{RHS} \\
\hline
2 & 0 & 0 & 1 & 1 & 0 & 8 \\
5 & 1 & 0 & 1 & 3 & 0 & 14 \\
9 & 0 & 0 & 0 & 1 & 1 & 5 \\
4 & 0 & 1 & 1 & 2 & 0 & 11 \\
\end{array} \]

\[ A^\text{cur}_{2,3} = 0, \quad A^\text{cur}_{5,3} = 0 \quad (\text{basic variables}) \]

\[ \text{RHS: } B^{-1} b = \begin{pmatrix} 1 & 3 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & 0 \end{pmatrix} \begin{pmatrix} 5 \\ 5 \\ 4 \end{pmatrix} = \begin{pmatrix} 14 \\ 5 \\ 11 \end{pmatrix} \]

\[ \text{Optimal: } C_b^T B^{-1} b = \begin{pmatrix} -1 & 0 & 2 \end{pmatrix} \begin{pmatrix} 14 \\ 5 \\ 11 \end{pmatrix} = 8 \]

\[ c^\text{cur} = \begin{pmatrix} -1 & 0 & 2 \end{pmatrix} \begin{pmatrix} 5 \\ 2 \\ 4 \end{pmatrix} - 1 = 2 \]

\[ C_{2,3} = C_{5,3} = 0 \quad (\text{basic variables}) \]

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Sensitivity Analysis I

\[ \max c^T x \]
\[ \text{s.t. } Ax \leq b \\
\quad x \geq 0 \]

- Suppose the optimal solution to this problem is \( x^* \), \( z^* \).
- Questions:
  - What happens if parameters \((A, b, c)\) are changed slightly (or not so slightly)?
  - Will current solution still be feasible? Optimal?
  - Will the value \( z^* \) change?
  - Which parameters are especially sensitive to these changes?
- Why is sensitivity analysis important?
  - Given data are not certain in reality.
  - Sometimes the solution to the original problem might look unreasonable.
  - Some parameters are related to policy decisions which might be changed.

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- How to perform sensitivity analysis?
  - One way is to solve the LP with modified data from scratch. This way is not effective.
  - Use the optimal solution (tableau) of the original problem plus the abstract view of simplex (fundamental insight, ...) to do the analysis.

We will adopt the second way.

Next time:
- Simple sensitivity analysis
  - Changing coefficients of obj. fun
  - Changing RHS