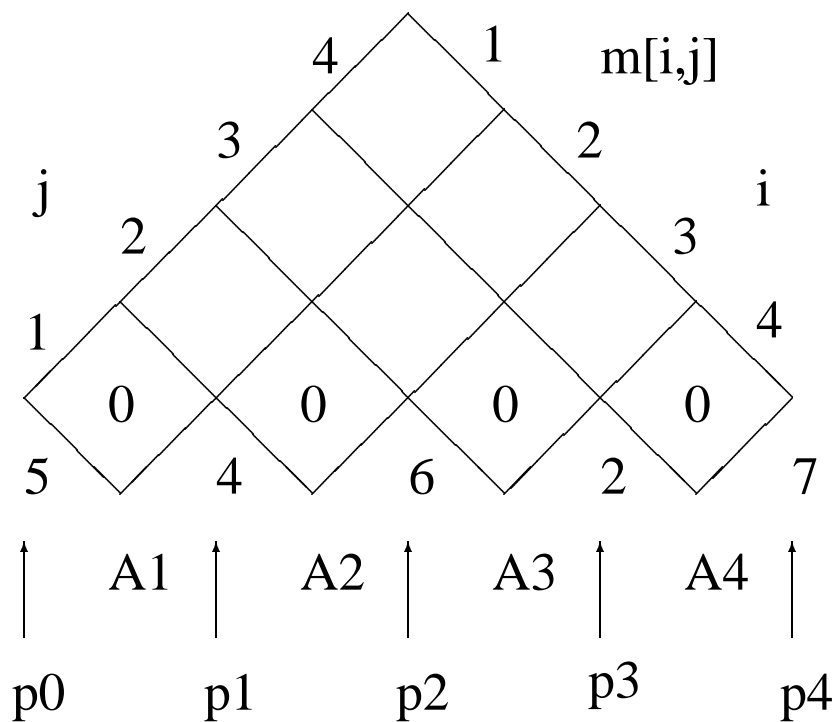


Example for the Bottom-Up Computation

Example: Given a chain of four matrices A_1, A_2, A_3 and A_4 , with $p_0 = 5, p_1 = 4, p_2 = 6, p_3 = 2$ and $p_4 = 7$. Find $m[1, 4]$.

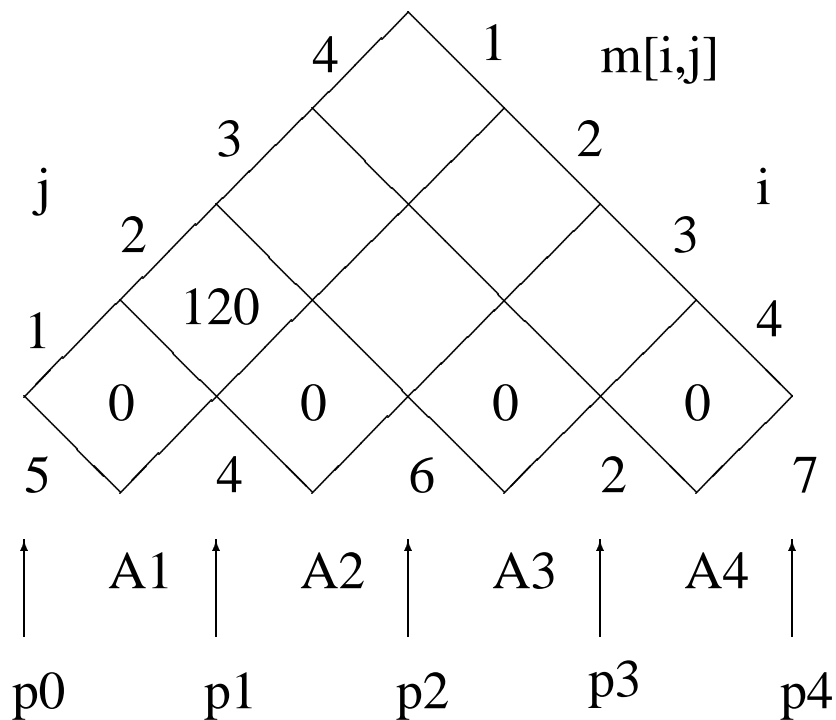
S0: Initialization



Example – Continued

Stp 1: Computing $m[1, 2]$ By definition

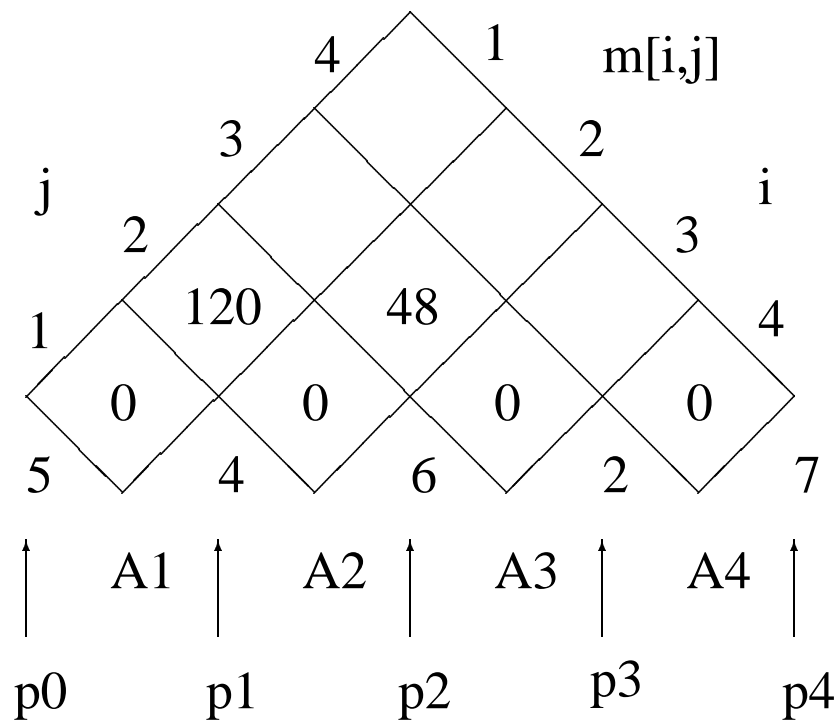
$$\begin{aligned} m[1, 2] &= \min_{1 \leq k < 2} (m[1, k] + m[k + 1, 2] + p_0 p_k p_2) \\ &= m[1, 1] + m[2, 2] + p_0 p_1 p_2 = 120. \end{aligned}$$



Example – Continued

Stp 2: Computing $m[2, 3]$ By definition

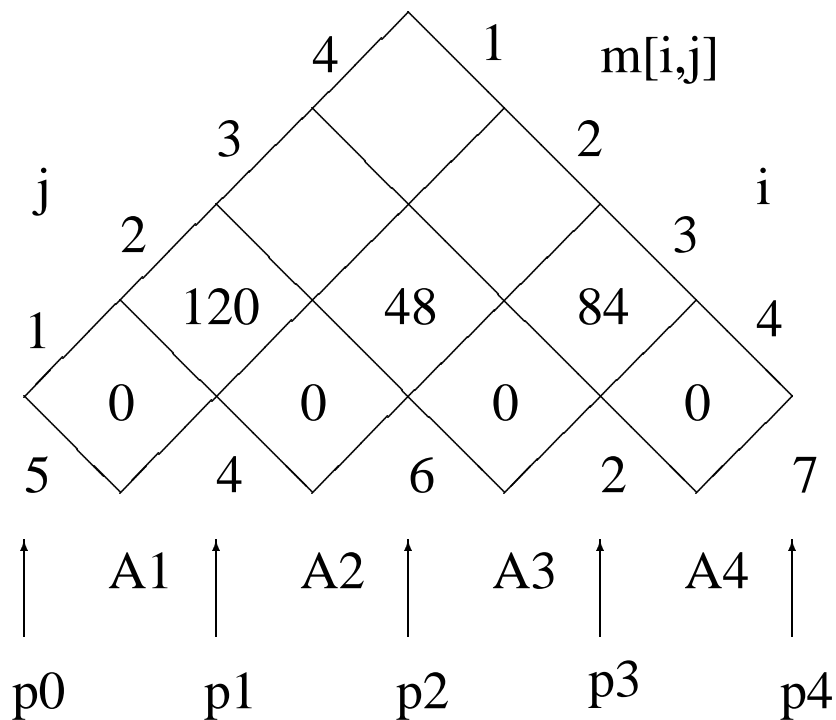
$$\begin{aligned}
 m[2, 3] &= \min_{2 \leq k < 3} (m[2, k] + m[k + 1, 3] + p_1 p_k p_3) \\
 &= m[2, 2] + m[3, 3] + p_1 p_2 p_3 = 48.
 \end{aligned}$$



Example – Continued

Stp3: Computing $m[3, 4]$ By definition

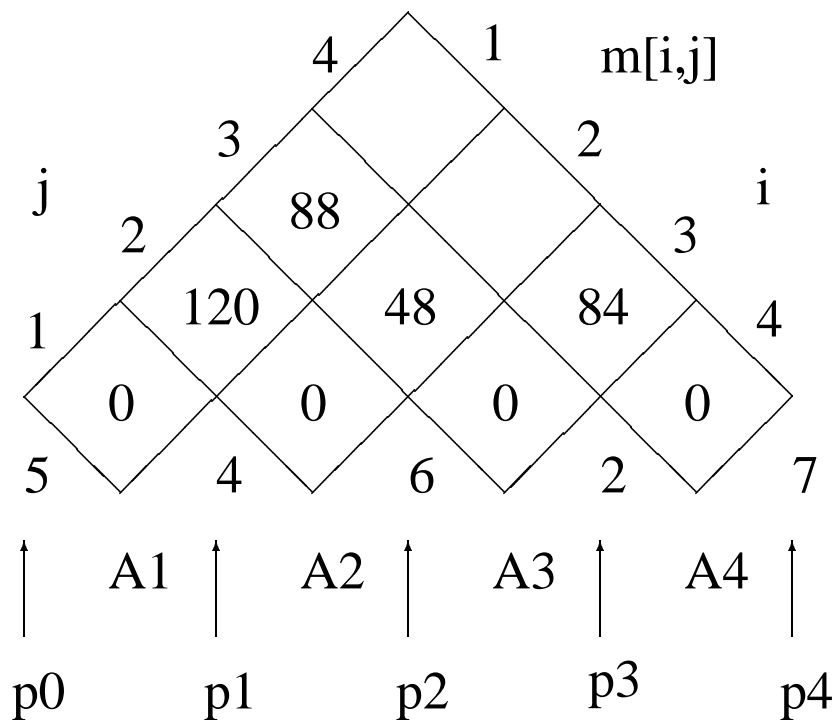
$$\begin{aligned} m[3, 4] &= \min_{3 \leq k < 4} (m[3, k] + m[k + 1, 4] + p_2 p_k p_4) \\ &= m[3, 3] + m[4, 4] + p_2 p_3 p_4 = 84. \end{aligned}$$



Example – Continued

Step 4: Computing $m[1, 3]$ By definition

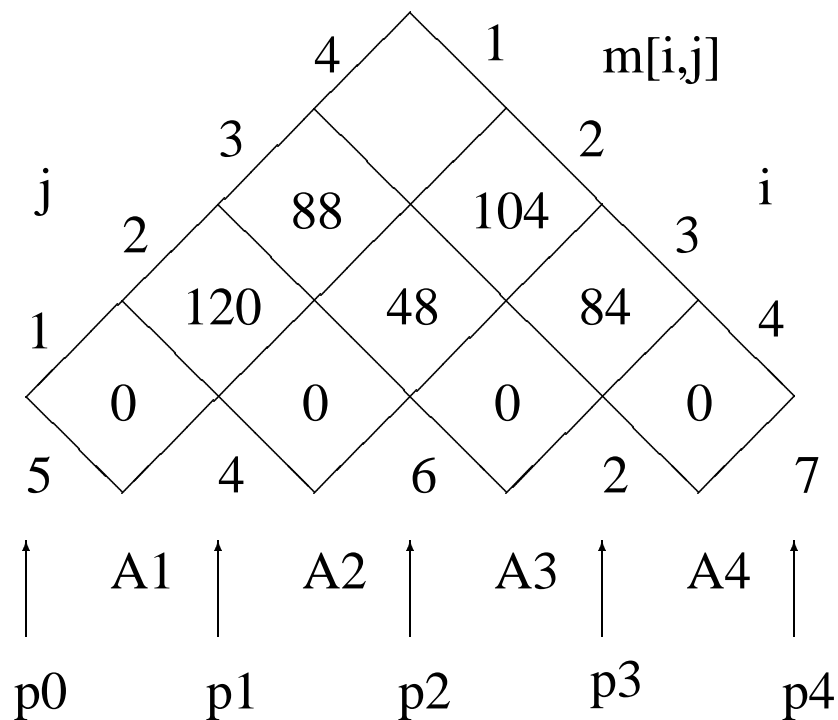
$$\begin{aligned} m[1, 3] &= \min_{1 \leq k < 3} (m[1, k] + m[k + 1, 3] + p_0 p_k p_3) \\ &= \min \left\{ \begin{array}{l} m[1, 1] + m[2, 3] + p_0 p_1 p_3 \\ m[1, 2] + m[3, 3] + p_0 p_2 p_3 \end{array} \right\} \\ &= 88. \end{aligned}$$



Example – Continued

Stp5: Computing $m[2, 4]$ By definition

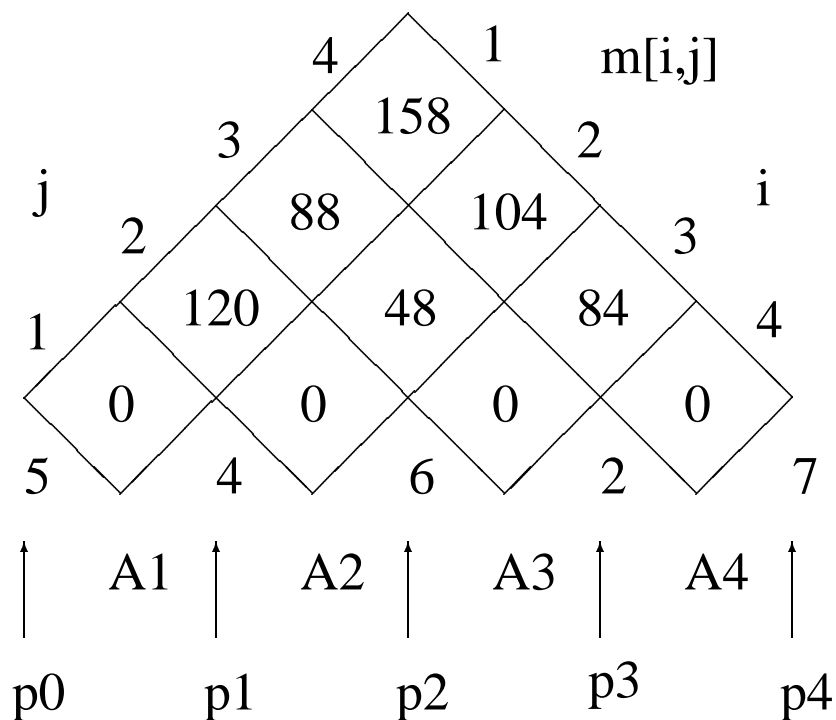
$$\begin{aligned}
 m[2, 4] &= \min_{2 \leq k < 4} (m[2, k] + m[k + 1, 4] + p_1 p_k p_4) \\
 &= \min \left\{ \begin{array}{l} m[2, 2] + m[3, 4] + p_1 p_2 p_4 \\ m[2, 3] + m[4, 4] + p_1 p_3 p_4 \end{array} \right\} \\
 &= 104.
 \end{aligned}$$



Example – Continued

St6: Computing $m[1, 4]$ By definition

$$\begin{aligned}
 m[1, 4] &= \min_{1 \leq k < 4} (m[1, k] + m[k + 1, 4] + p_0 p_k p_4) \\
 &= \min \left\{ \begin{array}{l} m[1, 1] + m[2, 4] + p_0 p_1 p_4 \\ m[1, 2] + m[3, 4] + p_0 p_2 p_4 \\ m[1, 3] + m[4, 4] + p_0 p_3 p_4 \end{array} \right\} \\
 &= 158.
 \end{aligned}$$



We are done!