Let $H(x)$ be a generating function for the series

$$h_n = 5h_{n-1} - 6h_{n-2}$$

where $h_0 = 1$ and $h_1 = 2$. Find a simple closed formula for $H(x)$.

$$\begin{aligned} H(x) - h_1 x - h_0 &= \sum_2^\infty h_n x^n \\ &= \sum_2^\infty 5h_{n-1}x^n + \sum_2^\infty -6h_{n-2}x^n \end{aligned}$$