Section 5.10, additional algebra

From $\boxed{5.94}$ $B = \dfrac{A \sin kx'}{\sin k(x'-L)}$, so substituting back into $\boxed{5.93}$ gives

$$kA\cos kx' + 1 = \frac{kA\cos k(x'-L)\sin kx'}{\sin k(x'-L)}.$$

So

$$\begin{aligned}
1 &= kA\left[\frac{\cos k(x'-L)\sin kx'}{\sin k(x'-L)} - \cos kx'\right] = kA\left[\frac{\cos k(x'-L)\sin kx' - \sin k(x'-L)\cos kx'}{\sin k(x'-L)}\right],\\
&= kA\left[\frac{(\cos kx'\cos kL + \sin kx'\sin kL)\sin kx' - (\sin kx'\cos kL - \cos kx'\sin kL)\cos kx'}{\sin k(x'-L)}\right],\\
&= kA\left[\frac{\sin kL(\sin^2 kx' + \cos^2 kx') + \cos kL(\cos kx'\sin kx' - \sin kx'\cos kx')}{\sin k(x'-L)}\right],\\
&= kA\left[\frac{\sin kL}{\sin k(x'-L)}\right].
\end{aligned}$$

Thus

$$A(x') = \frac{\sin k(x'-L)}{k\sin kL} \quad \text{and} \quad B(x') = \frac{\sin kx'}{k\sin kL}.$$