$$
\begin{aligned}
& \arg\min_x \frac{1}{2}(y-x)^2 + \frac{\lambda}{2}x^T D^T D x \\
= \quad & \arg\min_x \frac{1}{2}x^T(I + D^T D\lambda)x - x^T y \\
= \quad & \arg\min_x \frac{1}{2}(x - (I + D^T D\lambda)^{-1}y)^T(I + D^T D\lambda)(x - (I + D^T D\lambda)^{-1}y) \\
= \quad & (I + D^T D\lambda)^{-1}y \qquad (1)
\end{aligned}
$$