$$r = \frac{\Delta t K}{2\Delta x^2}$$

$$T_i^{n+1} - T_i^n = \sin(5x)\Delta t + \frac{\Delta t K}{2\Delta x^2}\left(T_{i+1}^{n+1} - 2T_i^{n+1} + T_{i-1}^{n+1} + T_{i+1}^n - 2T_i^n + T_{i-1}^n\right)$$

$$T_i^n + r(T_{i+1}^n - 2T_i^n + T_{i-1}^n) = -\Delta t \sin(5x) - r(T_{i+1}^{n+1} - 2T_i^{n+1} + T_{i-1}^{n+1}) + T_i^{n+1}$$

$$T_i^n(1-2r) + rT_{i+1}^n + rT_{i-1}^n = T_i^{n+1}(1+2r) - rT_{i+1}^{n+1} - rT_{i-1}^{n-1} - \Delta t \sin(5x)$$

$$\begin{bmatrix} (1+2r) & -r & 0 & 0 \\ -r & (1+2r) & -r & 0 \\ 0 & -r & (1+2r) & -r \\ 0 & 0 & -r & (1+2r) \end{bmatrix} \begin{bmatrix} T_2^{n+1} \\ T_3^{n+1} \\ \vdots \\ \\ \end{bmatrix} = \begin{bmatrix} b_2 \\ b_3 \\ \\ \\ \end{bmatrix}$$

$$b_2 = T_i(1-2r) + r(T_{i+1}^n) + r(T_{i-1}^n) + \Delta t \sin(5x)$$

$$= T_2^n(1-r) + r(T_3^n) + r(T_1^n) + \Delta t \sin(5 \cdot 2 \cdot \Delta x)$$