

Project1, FYS3150

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August 2020

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By multiplying \mathbf{A} and \mathbf{v} we get

$$\begin{bmatrix} 2 & -1 & 0 & \dots & \dots & 0 \\ -1 & 2 & -1 & 0 & \dots & \dots \\ 0 & -1 & 2 & -1 & 0 & \dots \\ \vdots & \vdots & \vdots & \ddots & & \\ 0 & \vdots & \vdots & -1 & 2 & -1 \\ 0 & \vdots & \vdots & 0 & -1 & 2 \end{bmatrix} \begin{bmatrix} v_0 \\ v_1 \\ v_2 \\ \vdots \\ v_n \\ v_{n+1} \end{bmatrix} = \begin{bmatrix} 2v_0 - v_1 \\ -v_0 + 2v_1 - v_2 \\ -v_1 + 2v_2 - v_3 \\ \vdots \\ -v_{n-1} + 2v_n - v_{n+1} \\ -v_n + 2v_{n+1} \end{bmatrix}$$
$$= \begin{bmatrix} h^2 f_0 \\ h^2 f_1 \\ h^2 f_2 \\ \vdots \\ h^2 f_n \\ h^2 f_{n+1} \end{bmatrix} = \tilde{\mathbf{b}}$$