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CS 450 HW#2 Q3

Creating Least Squares System

Set up the linear least squares system $Ax \backsimeq b$ for fitting the model function $f(t,x) = x_1 t + x_2 e^t$ to the three data points $(1,2), (2,3), (3,5)$.

$$
\begin{aligned}
f(t,x) &= x_1 t + x_2 e^t \backsimeq b \\
Ax &= \phi_1(t)x_1 + \phi_2(t)x_2 \backsimeq b \\
Ax &= \begin{pmatrix} t_1 & e^{t_1} \\ t_2 & e^{t_2} \\ t_3 & e^{t_3} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \backsimeq \begin{pmatrix} b_1 \\ b_2 \\ b_3 \end{pmatrix} \\
Ax &= \begin{pmatrix} 1 & e^1 \\ 2 & e^2 \\ 3 & e^3 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \backsimeq \begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix}
\end{aligned}
$$