

Homework 3
Numerical Matrix Analysis
Math 543
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Examples:

$$A = \begin{bmatrix} 2 & 3 \\ 2 & 4 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 0.6667 & -0.3333 \\ 0.6667 & 0.6667 \\ 0.3333 & -0.6667 \end{bmatrix} \begin{bmatrix} 3 & 5 \\ 0 & 1 \end{bmatrix} = QR$$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 0.5000 & 0.5735 & 0.6489 \\ -0.5000 & 0.8030 & -0.3244 \\ 0.5000 & 0.1147 & -0.4867 \\ 0.5000 & 0.1147 & -0.4867 \end{bmatrix} \begin{bmatrix} 2.0000 & 1.5000 & 2.0000 \\ 0 & 2.1794 & 2.7530 \\ 0 & 0 & 0.6489 \end{bmatrix} = QR$$

$$A = \begin{bmatrix} 1 & 5 & 9 \\ 2 & 6 & 10 \\ 3 & 7 & 11 \\ 4 & 8 & 12 \end{bmatrix} = \begin{bmatrix} 0.1826 & 0.8165 & -0.7851 \\ 0.3651 & 0.4082 & -0.3140 \\ 0.5477 & 0.0000 & 0.1570 \\ 0.7303 & -0.4082 & 0.5103 \end{bmatrix} \begin{bmatrix} 5.4772 & 12.7802 & 20.0832 \\ 0 & 3.2660 & 6.5320 \\ 0 & 0 & 0.0000 \end{bmatrix} = QR$$

Failed Example: (Non Full Rank)

$$A = \begin{bmatrix} 0 & 2 & 3 \\ 0 & 2 & 4 \\ 0 & 1 & 1 \end{bmatrix} = \begin{bmatrix} \text{NaN} & \text{NaN} & \text{NaN} \\ \text{NaN} & \text{NaN} & \text{NaN} \\ \text{NaN} & \text{NaN} & \text{NaN} \end{bmatrix} \begin{bmatrix} 0 & \text{NaN} & \text{NaN} \\ 0 & \text{NaN} & \text{NaN} \\ 0 & 0 & \text{NaN} \end{bmatrix}$$