

Math 241 Homework

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Due 13 September 2018

Complete the following problems. Fully justify each response.

1. Complete problems 3.8.8, 3.8.9 on page 147 of Coding the Matrix.
2. Complete problems 4.17.2, 4.17.3 on page 207 of Coding the Matrix.
3. For each of the following matrices, describe how \mathbf{v} and $A\mathbf{v}$ are related for an arbitrary vector $\mathbf{v} \in \mathbb{R}^n$.

$$(a) A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}, n = 3$$

$$(b) A = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 & 0 \\ \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & \frac{1}{2} \\ 0 & 0 & 0 & 0 & \frac{1}{2} & \frac{1}{2} \end{bmatrix}, n = 6$$

$$(c) A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}, n = 3$$

4. Prove that if M is an $m \times n$ matrix, and \mathbf{u}, \mathbf{v} are both vectors of length n , that $M(\mathbf{u} + \mathbf{v}) = M\mathbf{u} + M\mathbf{v}$.
5. Complete the second problem set found at autolab.andrew.cmu.edu. The submission for this is directly on autolab, no need to hand it in on paper.