Worksheet - Lecture 1

Introduction to Linear Algebra Part One

1. Use the following matrices or vectors to answer the following questions:

$$\mathbf{A} = \begin{pmatrix} 1 & 3 & 8 \\ 3 & 0 & -2 \\ 4 & 1 & -3 \end{pmatrix} \quad \mathbf{M} = \begin{pmatrix} 1 & 8 & -2 & 5 \\ 2 & 8 & 1 & 7 \end{pmatrix} \quad \mathbf{D} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 3 \end{pmatrix}$$

$$\mathbf{X} = \begin{pmatrix} 780 & 95000 \\ 600 & 60000 \\ 550 & 65000 \\ 400 & 35000 \\ 450 & 40000 \\ 750 & 80000 \end{pmatrix} \quad \mathbf{t} = \begin{pmatrix} 1 \\ 1.3 \\ 0.8 \\ 2 \\ 2.5 \\ 0.8 \\ 0.9 \end{pmatrix} \quad \mathbf{v} = \begin{pmatrix} 6 \\ 3 \\ -1 \\ 2 \end{pmatrix} \quad \mathbf{u} = \begin{pmatrix} 6 & 4 & 8 & 1 \end{pmatrix}$$

   a. Write the appropriate size/dimensions next to each matrix:

   A _____ **X**_____ **u**_____
   M _____ **t**_____
   D _____ **v**_____

   b. Which of these matrices are square? Which are rectangular?

   c. Give the following quantities:

   $A_{12} =$ $\mathbf{M}_{2\star} =$ $v_3 =$

   $M_{21} =$ $X_{42} =$

   $\mathbf{D}_{\star 3} =$ $t_5 =$

   c. What are the diagonal elements of **A**?

2. For the following quantities, use what you know about notation to tell if they are matrices, vectors, or scalars:

   H _____ $\mathbf{v}_2$_____ λ_____
   W _____ v_2_____ A_{ij}_____
   n_____ $\mathbf{M}_{\star 2}$_____ **r**_____