Math 2568 Homework 1
Math 2568 Due: August 26, 2019

Problem 1

Let $x = (2, 1, 3)$ and $y = (1, 1, -1)$ and compute the given expression.

§1.1, Exercise 2. $2x - 3y$.

Problem 2

§1.1, Exercise 4. Let A be the 3×4 matrix

$$A = \begin{pmatrix} 2 & -1 & 0 & 1 \\ 3 & 4 & -7 & 10 \\ 6 & -3 & 4 & 2 \end{pmatrix}.$$

(a) For which n is a row of A a vector in $\mathbb{R}^n$? .

(b) What is the 2^{nd} column of A?

(c) Let a_{ij} be the entry of A in the i^{th} row and the j^{th} column. What is $a_{23} - a_{31}$?

Problem 3

For each of the pairs of vectors or matrices decide whether addition of the members of the pair is possible; and, if addition is possible, perform the addition.

§1.1, Exercise 7. $x = (1, 2, 3)$ and $y = (-2, 1)$.

Problem 4

Let $A = \begin{pmatrix} 2 & 1 \\ -1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 0 & 2 \\ 3 & -1 \end{pmatrix}$ and compute the given expression.

§1.1, Exercise 10. $4A + B$.

Problem 5 (MATLAB)

Let $x = (1.2, 1.4, -2.45)$ and $y = (-2.6, 1.1, 0.65)$ and use MATLAB to compute the given expression.

§1.2, Exercise 3.(MATLAB) $3.27x - 7.4y$.

Problem 6 (MATLAB)

Let

$$A = \begin{pmatrix} 1.2 & 2.3 & -0.5 \\ 0.7 & -1.4 & 2.3 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} -2.9 & 1.23 & 1.6 \\ -2.2 & 1.67 & 0 \end{pmatrix}$$

and use MATLAB to compute the given expression.

§1.2, Exercise 5.(MATLAB) $-4.2A + 3.1B$.

Problem 7

Decide whether or not the given matrix is symmetric.

§1.3, Exercise 5. $A = \begin{pmatrix} 3 & 4 & -1 \\ 4 & 3 & 1 \\ -1 & 1 & 10 \end{pmatrix}$.

Problem 8

A general 2×2 diagonal matrix has the form $\begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$. Thus the two unknown real numbers a and b are needed to specify each 2×2 diagonal matrix. how many unknown real numbers are needed to specify each of the given matrices:

§1.3, Exercise 11. An upper triangular 2×2 matrix?

Problem 9

A general 2×2 diagonal matrix has the form $\begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$. Thus the two unknown real numbers a and b are needed to specify each 2×2 diagonal matrix. how

many unknown real numbers are needed to specify each of the given matrices:

§1.3, Exercise 13. An $m \times n$ matrix?

Problem 10

A general 2×2 diagonal matrix has the form $\begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}$. Thus the two unknown real numbers a and b are needed to specify each 2×2 diagonal matrix. how many unknown real numbers are needed to specify each of the given matrices:

§1.3, Exercise 16. A symmetric $n \times n$ matrix?

Problem 11

Determine whether the statement is *True* or *False*?

§1.3, Exercise 18. Every diagonal matrix is a multiple of the identity matrix.

Problem 12

§1.4, Exercise 9. Find a real number a so that the vectors

$$x = (1, 3, 2) \quad \text{and} \quad y = (2, a, -6)$$

are perpendicular.

Problem 13 (MATLAB)

Find the angle in degrees between the given pair of vectors.

§1.4, Exercise 21.(MATLAB) $x = (2, 1, -3, 4)$ and $y = (1, 1, -5, 7)$.