

Matrix Algebra Review
Assignment 2
Points – 30

2.1

Matrix Inverse

$$A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{bmatrix} \quad \text{and } b = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

- a. Find $A^{-1} = \text{inverse}(A)$. (3 pts)
- b. Solve $Ax = b$ using A^{-1} . (3 pts)

2.2

Rank

$$A = \begin{bmatrix} 2 & 2 & 6 \\ -1 & 1 & -1 \end{bmatrix}$$

- a. Based only on the number of rows of **A**, what is the maximum the *row* rank of **A** can be? (1 pt)
- b. Based only on the number of columns of **A**, what is the maximum the *column* rank of **A** can be? (1 pt)
- c. Based only on the order (number of rows and columns) of **A**, what is the maximum the *rank* of **A** can be? (1 pt)
- d. Find the *row* rank of **A**. (2 pt)
- e. Find the *column* rank of **A**. (2 pt)
- f. What is $\text{rank}(A)$? (1 pt)

2.3

Generalized Inverse

$$A = \begin{bmatrix} 2 & 2 & 6 \\ -1 & 1 & -1 \end{bmatrix} \quad b = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

- a. Find a generalized inverse of **A**. (3 pts)
- b. Find the general solution to $Ax = 0$. (2 pts)
- c. Find the general solution to $Ax = b$. (2 pts)

2.4

Determinants

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 2 & 0 & 1 \\ 1 & 2 & 1 \end{bmatrix}$$

- a. Find $\det(A)$. (3 pts)
- b. Is A invertible? (2 pts)
- c. What is $\text{rank}(A)$? (2 pts)
- d. What is $\det(A^t)$? (2 pts)