

Assignment 3

MA3.101: Linear Algebra

Spring 2021

March 24, 2021

1 Questions

1. Solve the following system of equation:

$$a + b + 2c + d = 1$$

$$a - b - c + d = 0$$

$$b + c = -1$$

$$a + b + d = 2$$

2. Solve the following system of equation:

$$2a + b = 3$$

$$4a + b = 7$$

$$2a + 5b = -1$$

3. Find the line of intersection of the planes:

$$3x + 2y + z = -1$$

$$2x - y + 4z = 5$$

4. Use Cramer's rule to solve the given linear system

$$x + y - z = 1$$

$$x + y + z = 2$$

$$x - y = 3.$$

5. Use Cramer's rule to solve the given linear system

$$2x + y - 3z = 1$$

$$y + z = 1$$

$$z = 1.$$

6. Prove that $\det(AB) = \det(BA)$

7. If A is idempotent find all possible values of $\det(A)$.

8. If A is a $m \times n$ matrix prove that every vector in $\text{null}(A)$ is orthogonal to every vector in $\text{row}(A)$.

9. Prove that if U is invertible $\text{rank}(UA) = \text{rank}(A)$.
10. Prove that for $m \times n$ matrices A and B , $\text{rank}(A + B) \leq \text{rank}(A) + \text{rank}(B)$.
11. Find the change of basis matrix from B to C for $p(x) = 2 - x$ where two bases are $B = [1, x]$ and $C = [x, x + 1]$.
12. Express $p(x)1 + 2x - 5x^2$ as a Taylor Polynomial about -2 .