(20) 1. Consider the matrix

$$A = \begin{bmatrix} 0 & 1 & 2 & 3 \\ 2 & 1 & 1 & 2 \\ 4 & 1 & 0 & 1 \end{bmatrix}$$

Find *rank* A, a basis for *Col* A and a basis for *Row* A.

(20) 6. Mark each statement True or False. Justify your answers.

a) If A and B are $n \times n$ matrices so that AB is invertible then BA is invertible.

b) Any 3 linearly independent vectors form a basis in R^3 form a basis.

(20) 5. Consider the set W of all polynomials p in P_3 with $p(1) = 0$.

a) Show that W is a subspace of P_3.

b) Find a basis in W.

(20) 2. **Problem 2**. Compute (or if undefined say so, explaining why)

a) A^{-1}, $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 1 & 0 \end{bmatrix}$

b) A^{2008}, $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$

c) $\begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix} [1\ 2\ 4]$

d) $\det \begin{bmatrix} 7 & 0 & 0 & 4 & 0 \\ 1 & 1 & 2 & 5 & 0 \\ 1 & 4 & 7 & 5 & 2 \\ 3 & 0 & 0 & 2 & 0 \\ 2 & 0 & 1 & 1 & 0 \end{bmatrix}$

(20) 3. a) State Cramer's rule.

b) Find the area of the triangle with vertices $(3, 2)$, $(7, 4)$ and $(4, 5)$.

(20) 4. Mark each statement True or False. Justify your answers.

a) $AB = BA$ for all square matrices A, B.

b) The set V of all 3×4 matrices is a vector space of dimension 12.