

Name: \_\_\_\_\_

Original Score: \_\_\_\_\_ / 32 marks

→ \_\_\_\_\_ % → ISM: \_\_\_\_\_ → IB: \_\_\_\_\_

Date: \_\_\_\_\_ Block: \_\_\_\_\_

After Corrections: \_\_\_\_\_ / 32 marks

## **MATH HONORS 2: UNIT 6 QUIZ 1** – Matrices

### **SECTION A: Calculator Inactive – 19 minutes**

1. Given matrices  $A = \begin{bmatrix} 3 & -2 \\ -4 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 4 & 2 & 0 \\ 0 & -3 & -1 \end{bmatrix}$ , find the following (if impossible, explain why): **(5M)**

a.  $A + B$

b.  $\det A$

c.  $A^{-1}$

d.  $AB$

e.  $B^{-1}$

2. Matrix  $A$  has dimensions  $n \times p$ , matrix  $B$  has dimensions  $m \times n$ , and matrix  $C$  has dimensions  $f \times m$ . **(2M)**

a. In what order can  $A$ ,  $B$ , and  $C$  be multiplied?

b. What are the dimensions of the product matrix?

3. Given matrices  $A = \begin{bmatrix} 0 & x & -3 \\ 2 & 3 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} -4 & -1 & 0 \\ 1 & 5 & -2 \end{bmatrix}$ , and  $C = \begin{bmatrix} -8 & 5 & 9 \\ -4 & 1 & y+6 \end{bmatrix}$ , determine the values of  $x$  and  $y$  such that  $2B - 3A = C$ . **(3M)**

4. Consider the following system of equations: 
$$\begin{cases} 8y + z = 11 \\ 4x - z = 1 \\ x + 10y + z = 14 \end{cases}$$
 (7M)

a. Write an augmented matrix that represents this system of equations.

b. Use row operations to reduce the matrix to row-reduced echelon form.

c. Explain how you can use your row-reduced echelon form to establish whether this system of equations is inconsistent (no solutions), independent (one solution), or dependent (infinite solutions).

d. Find the determinant of the  $3 \times 3$  coefficient matrix, and discuss whether the result supports your answer to part c.

**SECTION B: Calculator Active – 16 minutes**

5. Given matrix  $A = \begin{bmatrix} 1 & -1 & 0 & 2 \\ -2 & 3 & 1 & -3 \\ 0 & -1 & 3 & -2 \\ 2 & -3 & 0 & 1 \end{bmatrix}$ , find the following: (2M)

a.  $\det A$

b.  $A^{-1}$

6. A new sport is created, in which there are four ways to score points: throwing the ball into the net with the hand (Handball), kicking the ball into the net with the foot (Football), heading the ball into the net with the head (Skullball), and carrying the ball across the goal line (Touchdown). (4M)

Adam scores 3 Handballs, 2 Footballs, and 4 Touchdowns, giving him a total of 17 points

Bob scores 2 Handballs, 1 Skullball, and 2 Touchdowns, giving him a total of 11 points

Candace scores 4 Footballs, 2 Skullballs, and 1 Touchdown, giving her a total of 24 points

Debra scores 1 Handball, 3 Footballs, and 5 Touchdowns, giving her a total of 20 points

- a. Write a matrix equation that represents this information.

- b. Solve the matrix equation to determine how many points are awarded for each type of score (Handball, Football, Skullball, and Touchdown).

7. A linear system is defined by the equations  $(p - 2)x - 4y = 2k$  and  $2x - py = 6$ . Using your knowledge of matrices, determine the values for  $p$  and  $k$  such that the system has:
- No solution
  - Infinite solutions
  - A unique solution

8. Given that  $A$  and  $B$  are any  $2 \times 2$  matrices, show that  $\det(AB) = \det A \times \det B$ . (3M)

## STUDENT SELF-EVALUATION

After the time allocated for writing this assessment has passed (or if you have finished early), answer the following questions:

- Estimate the letter grade that you achieved on this assessment (e.g. A-, C+, etc.): \_\_\_\_\_
- Which concepts did you have the most difficulty with during this assessment and/or this unit?

## TEACHER COMMENTS

In every formal assessment this year, 2 marks, 1 mark, or 0 marks will be awarded for the clarity of your communication in the presentation of your solutions and your written explanations.

On this assessment, you were awarded: \_\_\_\_\_ / 2 marks for communication.