# CS 132 Quiz 3B (Group)

Gordon Ng

TOTAL POINTS

**10 / 11**

QUESTION 1

**1 3 / 3**

✓ **- 0 pts** **Correct**

**- 1 pts** Didn't show work using determinant

**- 1 pts** Didn't recognize correct matrix

**- 1 pts** Didn't give the correct answer

**- 3 pts** Missing

QUESTION 2

**2 4 / 5**

**- 0 pts** Correct

**- 1 pts** Part A Incorrect

**- 1 pts** Part B Incorrect

✓ **- 1 pts** **Part C Incorrect**

**- 1 pts** Part D Incorrect

**- 1 pts** Part E Incorrect

**- 5 pts** Missing

QUESTION 3

**3 2 / 2**

✓ **- 0 pts** **Correct**

**- 2 pts** Incorrect

**- 1 pts** Didn't state that determinant of matrix is nonzero

**- 1 pts** Stated determinant is nonzero, but gave incorrect answer

QUESTION 4

**4 1 / 1**

✓ **- 0 pts** **Correct**

**- 0.5 pts** Wrong explanation but correct boolean answer

**- 1 pts** Incorrect

# Boston University
## CS132 Quiz 3, Version B

Answer the questions in the spaces provided.
There are four questions and two pages for this quiz.

(First Name, Last Name): Gordon Ng  BU ID: U82744816

1. (3 points) Find the volume of the parallelepiped with one vertex at the origin and adjacent vertices at (1, 0, -3), (1, 2, 4), (5, 1, 0).

$$\begin{bmatrix} 1 & 1 & 5 \\ 0 & 2 & 1 \\ -3 & 4 & 0 \end{bmatrix}$$

$1 \quad (-1)^2 \cdot 1 \begin{bmatrix} 2 & 1 \\ 4 & 0 \end{bmatrix}$

$\cancel{(-1)^3 \cdot 0 \begin{bmatrix} 1 & 5 \\ 4 & 0 \end{bmatrix}}$

$1 \quad (-1)^4 \cdot -3 \begin{bmatrix} 1 & 5 \\ 2 & 1 \end{bmatrix}$

$1(-4) + -3(-9)$

$\boxed{23}$

$\frac{1}{0-4} \quad -\frac{8}{4}$

$\frac{1}{1-10} \quad \frac{21}{9}$

2. (5 points) Let **A** and **B** be 4×4 matrices, with det **A** = −3 and det **B** = −1. Use properties of determinants to compute:

   (a) det **AB**

   $\det(A) \cdot \det(B)$ $\quad 3$

   (b) det $\mathbf{B}^5$

   $(\det(B))^5 \quad (-1)^5 \quad -1$

   (c) det 2**A**

   $2(-3) \quad -6$

   (d) det $\mathbf{A}^T\mathbf{BA}$

   $\det A^T = \det(A) \quad (-3)(-1)(-3) \quad -9$

   (e) det $\mathbf{B}^{-1}\mathbf{AB}$

   $\cancel{B^{-1} \cdot B} \quad \boxed{-3}$

$$\begin{array}{r} 397 \\ 5 \\ \hline 485 \end{array}$$

3. (2 points) Use determinants to decide if the set of vectors are linearly independent. $\begin{bmatrix} 7 \\ -4 \\ -6 \end{bmatrix}, \begin{bmatrix} -8 \\ 5 \\ 7 \end{bmatrix}, \begin{bmatrix} 7 \\ 0 \\ -5 \end{bmatrix}$

$$\begin{bmatrix} 7 & -8 & 7 \\ -4 & 5 & 0 \\ -6 & 7 & -5 \end{bmatrix}$$

A set of n vectors of length n is linearly independent if the matrix with these vectors as columns has a non-zero determinant.

$$(-1)^2 \cdot 7 \begin{bmatrix} -4 & 5 \\ -6 & 7 \end{bmatrix} +$$

$$\cancel{(-1)^3 \cdot 0 \begin{bmatrix} 7 & -8 \\ -6 & 7 \end{bmatrix}}$$

$$(-1)^4 \cdot -5 \begin{bmatrix} 7 & -8 \\ -6 & 7 \end{bmatrix}$$

$$-28 + 30 \qquad 49 + 48$$

$$7(2) + \quad 97(-5) \neq 0$$

$$-485 \quad \cancel{-471}$$

$$\underline{14}$$

4. (1 point) (BONUS)

| The maximum you can receive on the quiz including the bonus question is 100%. The mark will not exceed more than 100%. |
|---|

Say whether the following sets of matrices form a subspace of the set of all matrices (under ordinary matrix addition and multiplication by scalars); give a counter-example (something that violates the rules for subspaces) for cases that are not a subspace.

(a) invertible matrices

No. $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} + \begin{bmatrix} -1 & 0 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$

Adding two invertible matrixes, the end result is not invertible.