

Math 265 Quiz#9: 5.1-5.3

For Division 7, Section 3:

1. **3 points.** Let A and B be $n \times n$ matrices and $\det A = 2, \det B = 0$.

- (i) **1 point.** Find $\det A^3$.
- (ii) **1 point.** Find $\det AB$.
- (iii) **1 point.** Find $\det A^{-1}$.

2. **7 points.** Let

$$A = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 2 & 3 & 0 & 7 \\ 1 & 2 & 1 & 1 \\ 0 & 3 & 2 & 2 \end{bmatrix}. \quad \text{Compute } \det A.$$

SOLUTION.

1. **3 points.**

- (i) **1 point.** $\det A^3 = (\det A)^3 = 8$.
- (ii) **1 point.** Find $\det AB = \det A \cdot \det B = 2 \cdot 0 = 0$.
- (iii) **1 point.** Find $\det A^{-1} = (\det A)^{-1} = 1/2$.

2. **7 points.**

$$\|A\| = -1 \cdot \begin{vmatrix} 2 & 0 & 7 \\ 1 & 1 & 1 \\ 0 & 2 & 2 \end{vmatrix} = - \left(2 \cdot \begin{vmatrix} 1 & 1 \\ 2 & 2 \end{vmatrix} + 7 \cdot \begin{vmatrix} 1 & 1 \\ 0 & 2 \end{vmatrix} \right) = -7 \cdot (2 \cdot 1 - 0) = -14.$$

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For **Division 8, Section 2**:

1. **3 points.** Let A and B be $n \times n$ matrices and $\det A = 3, \det B = 0$.

- (i) **1 point.** Find $\det A^2$.
- (ii) **1 point.** Find $\det AB$.
- (iii) **1 point.** Find $\det A^{-1}$.

2. **7 points.** Let

$$A = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 2 & 0 & 3 & 7 \\ 1 & 1 & 2 & 1 \\ 0 & 2 & 3 & 2 \end{bmatrix}. \quad \text{Compute } \det A.$$

SOLUTION.

1. **3 points.**

- (i) **1 point.** $\det A^2 = (\det A)^2 = 9$.
- (ii) **1 point.** Find $\det AB = \det A \cdot \det B = 3 \cdot 0 = 0$.
- (iii) **1 point.** Find $\det A^{-1} = (\det A)^{-1} = 1/3$.

2. **7 points.**

$$\|A\| = 1 \cdot \begin{vmatrix} 2 & 0 & 7 \\ 1 & 1 & 1 \\ 0 & 2 & 2 \end{vmatrix} = \left(2 \cdot \begin{vmatrix} 1 & 1 \\ 2 & 2 \end{vmatrix} + 7 \cdot \begin{vmatrix} 1 & 1 \\ 0 & 2 \end{vmatrix} \right) = 7 \cdot (2 \cdot 1 - 0) = 14.$$

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