

Math 250–Section #4 Quiz #4

Name: _____

1. (4 pts) Solve the system of equations

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & 3 & 4 \\ 4 & 9 & 16 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 5 \\ 25 \end{bmatrix}$$

for the variable y ONLY.

Answer: Best way is probably using Cramer's rule. After evaluating the answer will be $y = -3$. [Some people observed that these are Vandermonde determinants.]

2. (3 pts) Let A be a 3×3

$$A = [c_1 \mid c_2 \mid c_3]$$

It is known that $\det(A) = 2$. Find the determinants (give explanations!) of the matrices

$$B = [2c_2 \mid 2c_3 \mid 2c_1], \quad C = [2c_2 + c_3 \mid c_2 \mid c_1 + c_3], \quad D = [c_1 + c_2 \mid c_2 + 2c_3 \mid c_3 + c_1]$$

Answer: $\det B = 2^3 \det A = 16$

$\det C = -2$

$$\det D = \det [c_1 + c_2 \mid c_2 + 2c_3 \mid c_3 + c_1] = \det [c_1 + c_2 - (c_3 + c_1) \mid c_2 + 2c_3 \mid c_3 + c_1] =$$

$$\det [c_2 - c_3 \mid c_2 + 2c_3 \mid c_3 + c_1] = \det [c_2 - c_3 \mid c_2 + 2c_3 - (c_3 - c_3) \mid c_3 + c_1] =$$

$$\det [c_2 - c_3 \mid 3c_3 \mid c_3 + c_1] = \det [c_2 \mid 3c_3 \mid c_1] = 3(-1)^2 2 = 6$$

3. (3 pts) If A and B are 3×3 matrices with $\det A = 3$, $\det B = 2$, find [with explanation];

(a) $\det(2A)^2 B^2$

(b) $\det(-AB^{-1})$

Answer: (a) $\det(2A)^2 B^2 = 2^6 \det A^2 \det B^2 = 2^6 3^2 2^2$ (we used $\det(2A) = 2^3 \det A$, since A is 3×3)

(b) $\det -AB^{-1} = (-1)^3 \det A \det B^{-1} = -1 \det A (1/\det B) = -3/2$

Scratch