

Show all of your work; answers without work may receive no credit. Make sure that you answer each question completely.

Assume that

$$\rightarrow A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}, \quad \det(A) = 4.$$

1. (5 pts) Suppose that

$$C = \begin{bmatrix} a & b & c \\ 2d - 3g & 2e - 3h & 2f - 3i \\ g & h & i \end{bmatrix}.$$

What is  $\det(C)$ ?

*Solution.* Note that  $C$  is formed by applying to  $A$  the elementary row operations of multiplying the 2nd row by the scalar 2 and adding  $-3$  times the third row to the second row. Hence,  $\det(C) = (1)(2)\det(A) = 8$ .  $\square$

2. (5 pts) If  $B$  is a  $3 \times 3$  matrix with determinant 7, what is  $\det(B^T A^2)$ ?

*Solution.* Recall that the determinant is multiplicative. Hence,

$$\begin{aligned} \det(B^T A^2) &= \det(B^T) \det(A^2) \\ &= \det(B) (\det(A))^2 \\ &= 7 \cdot 4^2 = 112. \end{aligned}$$

$\square$