

PHILADELPHIA UNIVERSITY  
DEPARTMENT OF BASIC SCIENCES

Exam 2

Linear Algebra 1

02-01-2020

1. (4pt) Let  $A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$  and  $\det A = 6$ .

(a) Compute  $\det \begin{bmatrix} -a & 3g & d \\ -b & 3h & e \\ -c & 3i & f \end{bmatrix}$

(b) Compute  $\det \begin{bmatrix} d & e & f \\ a+d & b+e & c+f \\ a+3d+5g & b+3e+5h & c+3f+5i \end{bmatrix}$

(c) Compute  $\det(A^T A^{-1}) =$

(d) Compute  $\det 2A^{-1} =$

2. (5pt) Compute  $\det \begin{bmatrix} 1 & 1 & 1 & 0 & -1 \\ 2 & 0 & 5 & 0 & 1 \\ -1 & -2 & 0 & 1 & 1 \\ 0 & 3 & 1 & 0 & 1 \\ 2 & 0 & -1 & 0 & 0 \end{bmatrix}$  using row/column expansion.

3. (5pt) Solve the system  $\begin{cases} 2x + 4y - 2c = 2 \\ x + y - c = 2 \\ x - y = 2 \end{cases}$  using Cramer's rule.

4. (4pt) Let  $A = \begin{bmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{bmatrix}$ . Compute  $A^{-1}$  using cofactors.

5. (2pt) Compute the cosine of the angle between  $w = (1, 2, -1)$  and  $v = (3, 2, 1)$ .

-Amin Witno