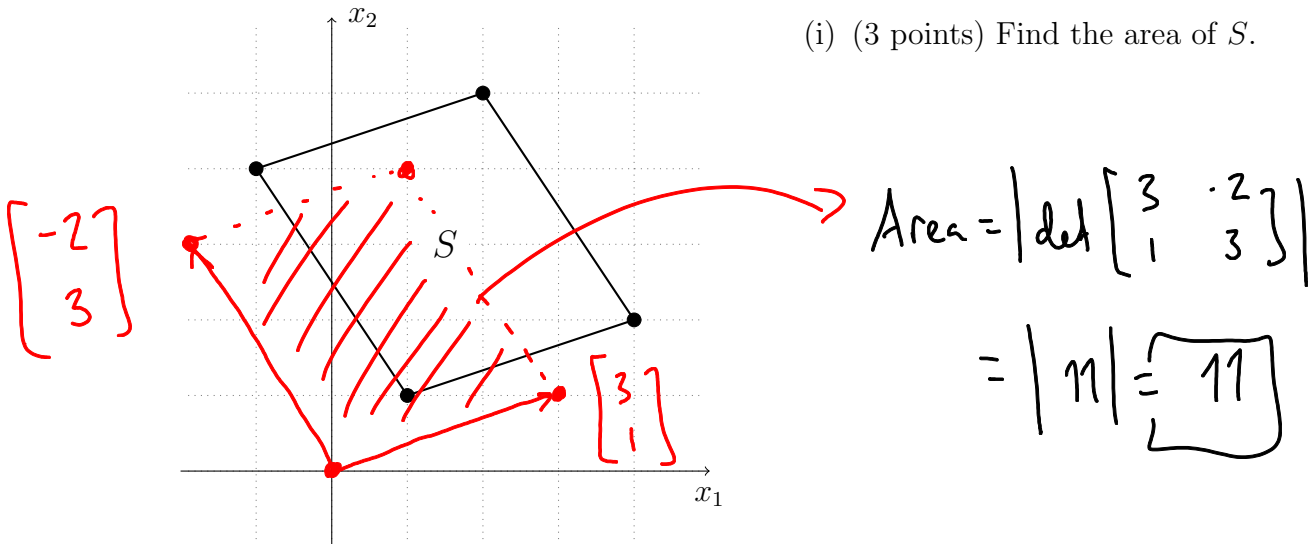


This is a two-stage quiz. You will receive this back with each question graded pass/fail in our next class meeting. You have until the date specified above to submit corrections for partial credit.

1. (5 points) Consider the parallelogram S plotted below with vertices $(1,1)$, $(-1,4)$, $(2,5)$, and $(4,2)$.

- (i) (3 points) Find the area of S .



- (ii) (2 points) Define a linear transformation $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ by $T(\underline{x}) = A\underline{x}$ where

$$A = \begin{bmatrix} 1 & 4 \\ 1 & 2 \end{bmatrix}.$$

Compute the area of the parallelogram $T(S)$, the image of S under T .

$$\begin{aligned} \text{area of } T(S) &= |\det A| \cdot (\text{area of } S) \\ &= |-2| \cdot (11) = \boxed{22} \end{aligned}$$

2. (5 points) Compute the determinant of

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

$$\det A = \begin{vmatrix} 1 & -1 & -3 & 0 \\ 0 & 1 & 5 & 4 \\ -1 & 0 & 5 & 3 \\ 3 & -3 & -2 & 3 \end{vmatrix} = \begin{vmatrix} 1 & -1 & -3 & 0 \\ 0 & 1 & 5 & 4 \\ 0 & -1 & 2 & 3 \\ 0 & 0 & 7 & 3 \end{vmatrix}$$

$$= \begin{vmatrix} 1 & -1 & -3 & 0 \\ 0 & 1 & 5 & 4 \\ 0 & 0 & 7 & 7 \\ 0 & 0 & 7 & 3 \end{vmatrix} = \begin{vmatrix} 7 & 7 \\ 7 & 3 \end{vmatrix} = 21 - 49 = \boxed{-28}.$$

$$= \begin{vmatrix} 1 & -1 & -3 & 0 \\ 0 & 1 & 5 & 4 \\ 0 & 0 & 7 & 7 \\ 0 & 0 & 0 & -4 \end{vmatrix}$$

$$= (1)(1)(7)(-4) = \boxed{-28}$$