

Name: _____

Directions: Show all work. No credit for answers without work.

1. [6 points] Find $\det \left(\begin{bmatrix} 2 & 1 & 4 & 3 \\ 2 & 1 & 3 & 3 \\ 2 & 1 & 1 & 4 \\ 1 & 3 & 1 & 2 \end{bmatrix} \right)$. *Hint:* this will be easier if you first perform some elementary operations.

2. Let $S = \left\{ \begin{bmatrix} x \\ y \end{bmatrix} : (x-3)^2 + (y-2)^2 \leq 9 \right\}$. That is, S is the disc centered at $\begin{bmatrix} 3 \\ 2 \end{bmatrix}$ with radius 3. Let $A = \begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$, and let $T = \{A\mathbf{u} : \mathbf{u} \in S\}$.

(a) [1 point] Find the area of S .

(b) Find the area of T .