Q5 316

Work all 3 Problems. *No notes, books, or calculators.*

(1) Define:
(a) $T : \mathbb{R}^n \to \mathbb{R}^m$ is linear.

(b) $H \subset \mathbb{R}^n$ is a subspace.

(2) Given $T : \mathbb{R}^n \to \mathbb{R}^m$, show that $H = \ker(T)$ is a subspace of $\mathbb{R}^n$.

(3) Compute the determinants (support your answer):

(a) $A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

(b) $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$

(c) $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$

(d) $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 2 & 1 \end{bmatrix}$