1. Determine whether the following statements are true (T) or false (F).
   
   (a) (2 points) If $L : V \to W$ is a linear transformation, then $\ker L$ is a subspace of $V$.

   (a) 

   (b) (2 points) If $L : V \to W$ is a linear transformation, then the range of $L$ is a subspace of $W$.

   (b) 

   (c) (2 points) If $E$ is an ordered basis for $V$, $L : V \to V$ is a linear transformation, and $A$ is the matrix representing $L$ relative to $E$, then $v \in \ker L$ if and only if $[v]_E \in N(A)$.

   (c) 

2. (4 points) Let $S$ be the subspace of $C[a, b]$ spanned by $e^x$ and $xe^x$. Let $D$ be the differentiation operator acting on $S$. Find the matrix representing $D$ with respect to the basis $[e^x, xe^x]$. 