1. Define a transformation $T: M_{2\times 2} \to \mathbb{P}_1$ by $T\left(\begin{bmatrix} a & b \\ c & d \end{bmatrix}\right) = (a-d)x + b$.

   a. Verify that T is a linear transformation. (What two properties do you need to show?)

   b. Find the kernel of T.

2. $C[0,2]$ denotes the set of all continuous real-valued functions with domain $[0,2]$. Let $H = \{ f(t) \in C[0,2] \mid f(0) = 0, f(1) = f(2) \}$. Show H is a subspace of $C[0,2]$.