

Turn in #4

Let  $R = M_2(\mathbb{R})$  the ring of  $2 \times 2$  real matrices, and let  $I$  be an ideal of  $R$ .

Given that

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \\ \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$$

belong to  $R$ , if  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  is a non-zero element of  $I$ , show that  $I = R$ .

**[10 points]**