## Turn these problems in with the assigned problems from the text:

(1) Let $\mathcal{S}$ be the subspace of $M_{2\times 2}(\mathbb{R})$ that consists of all $2 \times 2$ *symmetric* matrices.

(a) Find a basis for $\mathcal{S}$. (Show it is a basis.)

(b) What is the dimension of $\mathcal{S}$?

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## (Optional) Bonus Problems: For each problem that you solve correctly I will increase your homework score by one point. All or nothing for these – no partial credit.

(1) Consider the subspace of $\mathbb{R}^n$:

$$W = \left\{ \begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_n \end{bmatrix} \mid a_1 + a_2 + \cdots + a_n = 0 \right\}.$$

(You showed $W$ was a subspace on a previous homework.)

(a) Find a basis of $W$. Be sure to explain why your answer really is a basis.

(b) What is the dimension of $W$?