MA519 **Assignment 6** **Due Tuesday, March 10**

1. Do Problems 2 on page 229.

2. Do Problem 3 on page 229.

3. Do Problem 5 on page 229.

4. Do Problem 8 on page 229.

5. Recall from Problem 8 on page 193 that $G = \mathrm{GL}_n\mathbb{R}$ operates on $\mathbb{R}^n$ by left multiplication, and the stabilizer G_{e_1} is the subgroup of G consisting of all matrices of the form

$$\begin{pmatrix} 1 & v_0^t \\ 0 & M_0 \end{pmatrix},$$

where v_0 is an arbitrary vector in $\mathbb{R}^{n-1}$, v_0^t is its transpose (so that we can think of it as a row vector rather than a column vector), 0 is the zero vector in $\mathbb{R}^{n-1}$ and $M_0 \in \mathrm{GL}_{n-1}\mathbb{R}$.

As a set, G_{e_1} is in obvious one-to-one correspondence with $\mathbb{R}^{n-1} \times \mathrm{GL}_{n-1}\mathbb{R}$. Find a multiplication rule that will make $\mathbb{R}^{n-1} \times \mathrm{GL}_{n-1}\mathbb{R}$ a group that is isomorphic to G_{e_1}. Verify the group axioms. Hint: Consider the product of two arbitrary matrices of G_{e_1} to determine the multiplication. Use block matrix multiplication or else let n be a small, specific number.