Linear Algebra (Math 220)

Assignment due Tuesday, February 12

1 Reading

Read § 2.5 in Matthews.

2 Exercises

1. Let R(s, t) be the function from $\mathbf{R}^2$ to $\mathbf{R}^3$ defined by

$$R(s,t) \;=\; (s+2t, -2s-t, -2s+2t) \quad .$$

   (a) Find equation(s) that characterize the set S of all points (x, y, z) in $\mathbf{R}^3$ that arise as $R(s, t)$ for at least one pair (s, t).

   (b) What kind of subset of $\mathbf{R}^3$ is S?

2. Find the inverse of the matrix

$$M \;=\; \begin{pmatrix} 1 & -1 \\ 1 & 0 \end{pmatrix} \quad .$$

3. Find the smallest integer $k \geq 1$ for which the matrix power M^k is the identity matrix when M is the matrix of the previous exercise.

4. Find a simple formula for the k-th matrix power of the matrix

$$T \;=\; \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \quad .$$