1. Complete the following problems from the textbook:
   - Section 10.2: 1c, 2a, 5ab, 16, 17, 28, 30a
   - Section 10.3: 1, 2cf, 10, 12, 23, 29, 30

2. Let $Q$ be an orthogonal matrix. Prove that $\|Q\|_2 = 1$.

3. Let $\{T_k\}_{k=1}^\infty$ be a sequence of $n \times n$ matrices and define the iteration $u^{(k+1)} = T_k u^{(k)}$ for $k \geq 1$. Justify your answers.
   - If each of the matrices satisfies $\|T_k\| \leq c < 1$ for some matrix norm and constant $c$, does the sequence $u^{(k+1)} = T_k u^{(k)}$ converge to 0 for any initial point $u^{(1)}$?
   - What if the matrices only satisfy $\|T_k\| < 1$? (Hint, consider the cases $T_k = r^{1/k}I$ and $T_k = r^{1/k^2}I$ for $0 < r < 1$.)