1. Suppose \( m = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \) and \( C \) is the imaginary axis \( i\mathbb{R} \). Find the exact center and radius of all the circles \( m^n(C) \).
   
   Hint: Find a formula for \( m^n(\infty) \). Use that to locate the center of \( m^n(C) \).

2. Suppose \( T(z) \) satisfies
   \[
   \frac{T(z) - 1}{T(z) + 1} = 2 \frac{z - 1}{z + 1}.
   \]
   
   (a) Let \( C \) be the unit circle. Find the center and radius of \( T^n(C) \) for all integers \( n \).
   
   (b) Let \( C \) be the imaginary axis \( i\mathbb{R} \). Find the center and radius of \( T^n(C) \) for all integers \( n \).