EE615: Problem set 5
Problems 3.9, 3.11, 3.12, 3.13, 3.19, 3.20, 3.X2

Problem 3.X2
Consider a stationary stochastic process \( u(n) \) with correlation function
\[
r(k) = E\left[u(n)u(n-k)\right] = \begin{cases} c^{|k|}r(0) & |k| < 10 \\ 0 & |k| \geq 10 \end{cases}
\]
for some real constant \( c < 1 \). We consider linear prediction of the process.
1. Find the coefficient \( a_{1,1} \) of the forward prediction error filter, and the prediction error power \( P_1 \).
2. Prove that \( a_{m,k} = 0 \) for \( 1 < m, k < 10 \), and find \( P_m, m < 10 \).
3. Find \( a_{10,k}, k = 0, 1, \ldots, 10 \) and \( P_{10} \).