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 $a_{10,k}$, $k = 0,1,..,10$ and P_{10}.