a) $X(t) = A + B\cos(\omega_0 t + \Theta)$

$E(A) = 0$; $E(B) = 0$; $Var(A) = E(A^2) = 3$; $Var(B) = E(B^2) = 4$

A ve B bağımsız

$$E(A.B) = E(A).E(B) = 0$$

$$f(\Theta) = \begin{cases} \frac{1}{\pi} & 0 < \Theta < \pi \\ 0 & dd \end{cases}$$

$$E[X(t)] = E[A + B\cos(\omega_0 t + \Theta)] = E(A) + E(B).E(\cos(\omega_0 t + \Theta)) = 0$$

$$R_{XX}(t, t+\tau) = E[(A + B\cos(\omega_0 t + \Theta))(A + B\cos(\omega_0 t + \omega_0 \tau + \Theta))]$$

$$= E(A^2) + E[A.B\cos(\omega_0 t + \omega_0 \tau + \Theta)] + E[BA\cos(\omega_0 t + \Theta)]$$

$$+ E[B^2 \cos(\omega_0 t + \Theta)\cos(\omega_0 t + \omega_0 \tau + \Theta)]$$

$$= 3 + 4E[\cos(\underbrace{\omega_0 t + \Theta}_{x})\cos(\underbrace{\omega_0 t + \omega_0 \tau + \Theta}_{y})]$$

$$= 3 + \frac{4}{2}E[\cos(\omega_0 t + \Theta - \omega_0 t - \omega_0 \tau - \Theta) + \cos(\omega_0 t + \Theta + \omega_0 t + \omega_0 \tau + \Theta)]$$

$$= 3 + \frac{4}{2}\{E[\cos(-\omega_0 \tau)] + E[\cos(2\omega_0 t + \omega_0 \tau + 2\Theta)]\}$$

$$= 3 + 2\cos(\omega_0 \tau) + 2\int_0^{\pi} \cos(2\omega_0 t + \omega_0 \tau + 2\Theta)\frac{1}{\pi}\,d\Theta$$

$$= 3 + 2\cos(\omega_0 \tau) + \frac{4}{\pi}\left[\sin(2\omega_0 t + \omega_0 \tau + 2\Theta)\Big|_0^{\pi}\right]$$

$$= 3 + 2\cos(\omega_0 \tau) = R_{XX}(\tau)$$

$X(t)$ süreci geniş anlamda durağan süreçtir.

b) $Y(t) = \sin(\omega_0 t + \Theta)$

$$R_{XY}(t, t+\tau) = E[\{A + B\cos(\omega_0 t + \Theta)\}\{\sin(\omega_0 t + \omega_0 \tau + \Theta)\}]$$

$$= \underset{0}{E[A]}\,E[\sin(\omega_0 t + \omega_0 \tau + \Theta)] + E[B\cos(\omega_0 t + \Theta)\sin(\omega_0 t + \omega_0 \tau + \Theta)] = 0$$