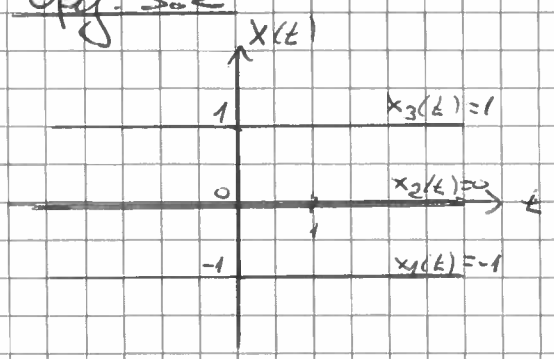
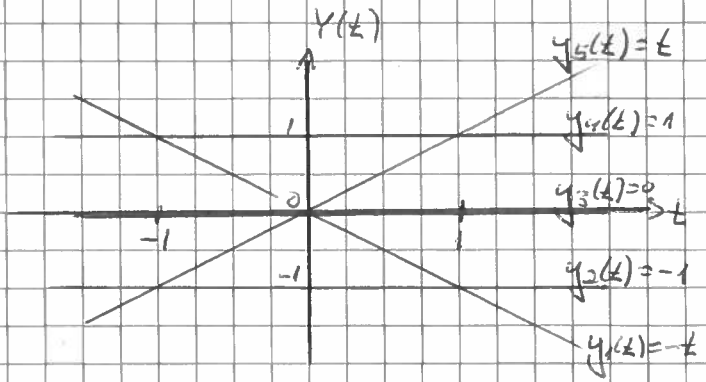
SM

Opg. 3.2





$f_X(x_i) = \frac{1}{3}$, $i=1,2,3$ $\qquad$ $f_Y(y_i) = \frac{1}{5}$, $i=1,2,3,4,5$

a) $\underline{\mu_X(t) = \sum_{i=1}^{3} x_i(t)\cdot f_X(x_i) = \frac{1}{3}\cdot(-1+0+1) = 0}$

$\underline{\sigma_X^2(t) = \sum_{i=1}^{3}(x_i(t)-\mu_X(t))^2\cdot f_X(x_i) = \frac{1}{3}\left((-1+0)^2+(0-0)^2+(1-0)^2\right) = \frac{2}{3}}$

$\underline{R_{XX}(t,t+\tau) = E[X(t)\cdot X(t+\tau)] = \sum_{i=1}^{3} x_i(t)\cdot x_i(t+\tau)\cdot f_X(x_i)}$

$= \frac{1}{3}\cdot\left((-1)\cdot(-1)+0\cdot 0+1\cdot 1\right) = \frac{2}{3}$

μ_X, σ_X^2, R_{XX} uafh. af t $\rightarrow$ $\underline{X \text{ er WSS}}$

b) $\underline{\mu_Y(t) = \sum_{i=1}^{5} y_i(t)\cdot f_Y(y_i) = \frac{1}{5}(-t-1+0+1+t) = 0}$

$\underline{\sigma_Y^2(t) = \sum_{i=1}^{5}(y_i(t)-\mu_Y(t))^2\cdot f_Y(t) = \frac{1}{5}\cdot\left((-t-0)^2+(-1-0)^2+(0-0)^2+(1-0)^2+(t-0)^2\right)}$

$= \frac{1}{5}(2t^2+2) = \frac{2}{5}(t^2+1)$

$\underline{R_{YY}(t,t+\tau) = E[Y(t)\cdot Y(t+\tau)] = \sum_{i=1}^{5} y_i(t)\cdot y_i(t+\tau)\cdot f_Y(y_i)}$

$= \frac{1}{5}\left(-t\cdot(-(t+\tau)) + (-1)(-1) + 0\cdot 0 + 1\cdot 1 + t\cdot(t+\tau)\right)$

$= \frac{1}{5}\cdot(2\cdot t(t+\tau)+2) = \underline{\frac{2}{5}\cdot t(t+\tau)}$

$\sigma_Y^2(t)$ og $R_{YY}(t,t+\tau)$ afhænger af t $\rightarrow$ $\underline{Y \text{ er ikke WSS}}$

c) $R_{XY}(t_1,t_2) = E[X(t_1)\cdot X(t_2)] = E[X(t_1)]\cdot E[Y(t_2)]$ $\leftarrow$ X og Y uafh.

$= \mu_X(t_1)\cdot\mu_Y(t_2) = 0\cdot 0 = 0$

$\Downarrow$

$\underline{R_{XY}(0,1) = 0}$