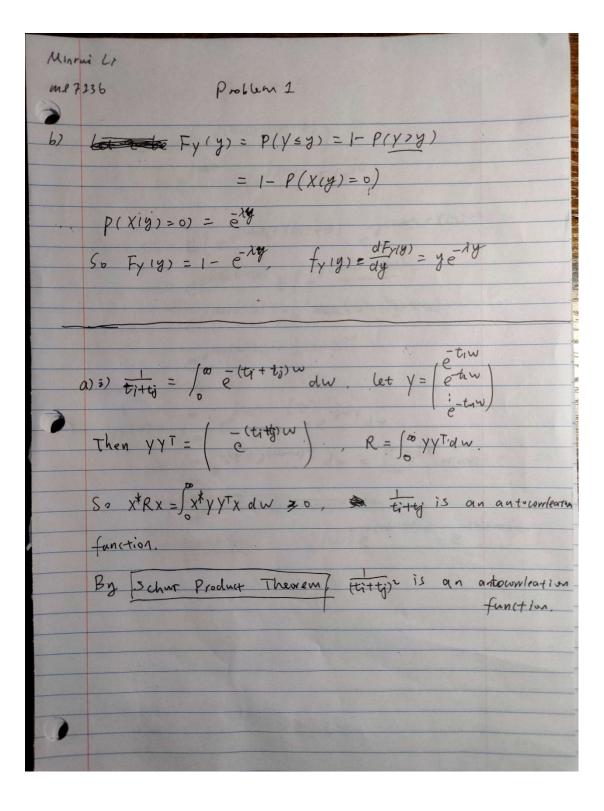
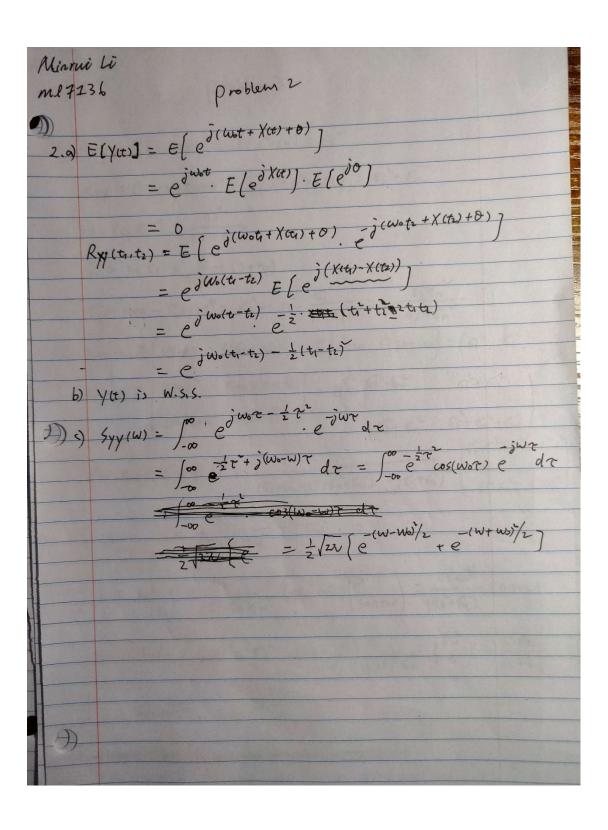
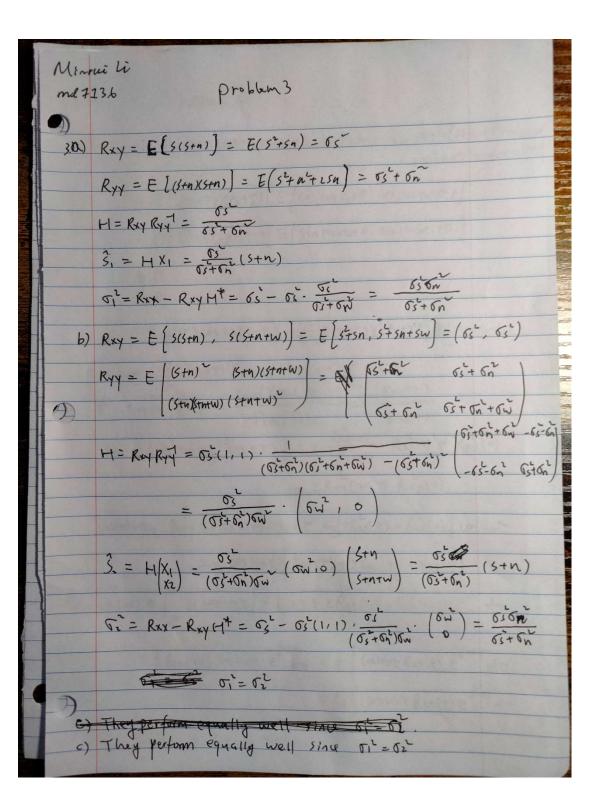
Minra Li Proble-1 m17136 a) if we can prove titti is an auto correlation function, then by Schur Product Theorem, (titig) is also an autocorrelation function. The proof of titti i) an autocorrelation function is on the next page. Thus R = 500 yyTdw. For a jiven x + 0, x*Rx = 50 x*yyTxdw So Ris non-negative definite, titis is an autocomplation = E XI MI MIT , XIZO So X*RX = I di X* Mi Mi X >0. R is non-negative definite min (ti, ti) is an autoconfeation function.







Minrai Li ml7236 Problem 4 4. a) Ry (tut.) = = { (X(t+T) cos(wot, to) + X (t,+T) Sig(wot, +0)}. (X(t+T) cos(wot, to)) = E X(+1+T) X(+2+T) E [(03(Wo to+8) cos (Woto+0)) + E (XitAT) XttatT) E (Sin (Wotot &) Sin (Wotot &) +0 = Rxx(7) W5 Wo(t-t2) + = (X(t+T)) (t2+T) (65 Wo(t-t1) We know $E(X^{2}(t_{1}+T)X^{2}(t_{2}+T)) = 20^{4}e^{2} + 6^{4}$ $C^{2}=Kxy(0), x e^{2} = \frac{Cov(X(t_{1}),X(t_{2}))}{F_{X}(t_{1})} = \frac{F_{X}(x_{1})}{F_{X}(x_{2})} = \frac{F_{X}(x_{1})}{F_{X}(x_{2})} = \frac{F_{X}(x_{1})}{F_{X}(x_{2})} = \frac{F_{X}(x_{2})}{F_{X}(x_{2})} = \frac{F_{X}(x_{2})}{F_{X}(x_{2$ = 2 Rxx(2) + Rxx(0) Therefore, Ryy = 1 Rxx(2) cos wat + [2(2(2xx)2) + (xx(0)) cos wat = = = CO3 WOR (RXX(T) + 2 RXX(T) + RXX(O) \$ 544 (m) = \(\frac{1}{2} \cos \ose \) \(\text{Rxx}(\ta) + \text{Rxx}(\ta) \) \(\frac{1}{2} \cos \ose \sigma \) \(\text{Rxx}(\ta) + \text{Rxx}(\ta) \) \(\frac{1}{2} \cos \ose \sigma \) = 1 Rxx(0) (coswoz. e dr + 1 (coswor Rxx(r) e dr + the coswot Rxx(r) e de = I, + I2 + I3

Minrue Li Problem 4 me 7236 71= 1 Rxx(0) /00 cos wot e dt = 1 Rxx(0) 2/3(w-wo) + 8(w+wo) 12= = = = = (00 cognor (xx(2)e-jw2 dr $= \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{i\omega_{x}\tau} - i\omega_{x}\tau + \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{-i\omega_{x}\tau} d\tau$ $= \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{i\omega_{x}\tau} d\tau + \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{-i\omega_{x}\tau} d\tau$ $= \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{-i\omega_{x}\tau} d\tau + \frac{1}{4} \int_{-\infty}^{\infty} R \times x(\tau) e^{-i\omega_{x}\tau} d\tau$ = \$ 5xx(W-Wo) + \$ 5xx (V+Wb) 13= 000 WIT RXX(T) e dr = [(zz) - Sxx(w) e dw) coswore dr Therefore, SyyIW) = 1/2 Rxx(0) 2 (8(W-W) + 8(W+W)) + \$ \xx(w-w0) + + > xx (w+w0) + lo (1 los) xx (w) e dw) cosunt e dr

Mirrai Li problem 4 m17136 6) Rxx(x)= 22 / 5xx(w) e onw $=\frac{1}{22}\int_{-2}^{2}e^{j\omega\gamma}d\omega$ = 1 (2 cosur dw = 1 SIN WY -2 = 1 sin(22) = Sin((NC) $f_{X}(X) = \frac{1}{(2\lambda)\sqrt{|R|}} e^{\frac{1}{2}X^T} K^{\frac{1}{2}}$ $R = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ $X^T R X = \frac{X(t)}{X(t+1)} (X(t) X(t+1)) \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X(t) \\ X(t+1) \end{pmatrix} = X(t) + X(t+1)$ $f_{\underline{X}}(\underline{X}) = \frac{1}{2\nu} e^{\frac{1}{2}(X(\underline{t}) + X^2(\underline{t}+1))}$ $P_r(\chi(t)>0, \chi(t+1)>0) = \int_0^\infty \int_0^\infty \frac{1-\frac{1}{2}(\chi(t)+\chi(t+1))}{\pi} d\chi(t) d\chi(t+1)$ = - - -