ECON 522
HW 2

1.4
$$E\left[(X_t-\mu_t)(X_s-\mu_s)\right]$$
$$= E\left[X_tX_s - X_t\mu_s - X_s\mu_t + \mu_s\mu_t\right]$$
$$= E\left[X_tX_s\right] - \mu_s\mu_t - \mu_s\mu_t + \mu_{st}$$
$$= E\left[X_tX_s\right] - \mu_s\mu_t$$

1.5 (a)
$$\mu_t = \begin{cases} 0 & t=1,\cdots,100 \\ 10\exp\left\{-\left(\frac{t-100}{20}\right)\right\}\cos\left(\frac{2\pi t}{4}\right) & t=101,\cdots,200 \end{cases}$$

$$\gamma_h = \begin{cases} 1 & h=0 \\ 0 & h\neq 0 \end{cases}$$

(b)
$$\mu_t = \begin{cases} 0 & t=1,\cdots,100 \\ 10\exp\left\{-\left(\frac{t-100}{200}\right)\right\}\cos\left(\frac{2\pi t}{4}\right) & t=101,\cdots,200 \end{cases}$$

$$\gamma_h = \begin{cases} 1 & h=0 \\ 0 & h\neq 0 \end{cases}$$

1.7 $X_t = w_{t-1} + 2w_t + w_{t+1}$, $w \sim wn(0, \sigma_w^2)$

$$\gamma(h) = \begin{cases} 6\sigma_w^2 & h = 0 \\ 4\sigma_w^2 & h = \pm 1 \\ 1\sigma_w^2 & h = \pm 2 \\ 0 & \text{else} \end{cases}$$

$$\rho(h) = \begin{cases} 1 & h = 0 \\ 2/3 & h = \pm 1 \\ 1/6 & h = \pm 2 \\ 0 & \text{else} \end{cases}$$