c) $\gamma(t,t+h) = E[(X_t - \mu_t)(X_{t+h} - \mu_{t+h})]$

$= E[(X_t)(X_{t+h})]$

$= E[(\sin(\omega t + \theta) + k\varepsilon)(\sin(\omega t + \omega h + \theta) + k\varepsilon)]$

$= E[\sin(\omega t + \theta)\sin(\omega t + \omega h + \theta) + k^2\varepsilon^2]$

$= \frac{1}{4\pi}\int_{-\pi}^{\pi} \cos(\omega h) - \cos(2\omega t + 2\theta + \omega h)\, d\theta + k^2$

$= \frac{1}{4\pi}\cos(\omega h)\int_{-\pi}^{\pi} \cos(2\omega t + 2\theta + \omega h)\, d\theta + k^2$

(2π)

$= \frac{1}{2}\cos(\omega h) + k^2$

$= \frac{1}{2}\cos(\omega h) + 9$

$\rho(t,t+h) = \frac{\gamma(t,t+h)}{\sigma(t)\,\sigma(t+h)}$

$= \left(\frac{1}{2}\cos(\omega h) + 9\right) \cdot \frac{2}{19}$

$= \cos(\omega h) \cdot \frac{9}{19}$