STAT 520 – Final Exam – Formula Sheet

In an $AR(1)$ model:

$$\rho_k = \phi^k, \text{ for } k = 1, 2, 3, \ldots$$

In an $ARMA(1,1)$ model with equation $Y_t = \phi Y_{t-1} + e_t - \theta e_{t-1}$:

$$var(Y_t) = \gamma_0 = \frac{1 - 2\phi\theta + \theta^2}{1 - \phi^2}\sigma_e^2$$

$$\rho_k = \frac{(1 - \theta\phi)(\phi - \theta)}{1 - 2\theta\phi + \theta^2}\phi^{k-1}$$

Method of Moments with an $AR(2)$ model:

$$\hat{\phi}_1 = \frac{r_1(1 - r_2)}{1 - r_1^2} \text{ and } \hat{\phi}_2 = \frac{r_2 - r_1^2}{1 - r_1^2}$$

In an $AR(1)$ model, a large-sample $100(1 - \alpha)\%$ CI for ϕ is:

$$\hat{\phi} \pm z_{\alpha/2}\sqrt{(1 - \hat{\phi}^2)/n}$$

In an $MA(1)$ model, a large-sample $100(1 - \alpha)\%$ CI for θ is:

$$\hat{\theta} \pm z_{\alpha/2}\sqrt{(1 - \hat{\theta}^2)/n}$$

Forecast with a lead time ℓ in an $AR(1)$ model:

$$\hat{Y}_t(\ell) = \mu + \phi^\ell(Y_t - \mu)$$

Forecast Error in $AR(1)$ model:

$$var[e_t(\ell)] = \sigma_e^2\left[\frac{1 - \phi^{2\ell}}{1 - \phi^2}\right]$$