Session 26

$Y_1 = X_1 + 2X_2$

$Y_2 = 2X_1 + X_2$

$\Sigma_{xx} = \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$

26-1

$Z = Y_1 + 2Y_2$ 1 step results $\sigma_z^2 = 204$

$\Sigma_{zz} = \sigma_z^2$ (for scalar) $\sigma_z = \sqrt{204}$

$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$, $\Sigma_{yy} = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 24 & 21 \\ 21 & 24 \end{bmatrix}$

$Z = \begin{bmatrix} 1 & 2 \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix}$, $\Sigma_{zz} = \sigma_z^2 = \begin{bmatrix} 1 & 2 \end{bmatrix} \begin{bmatrix} 24 & 21 \\ 21 & 24 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

$\sigma_z^2 = 204$, $\sigma_z = \sqrt{204}$

$\Rightarrow$ EP using substitution, in 1-step, or 2-steps, 3-steps, ... , n-steps

Oct 26-3:26 PM

$Y = Ax$ or $Y = Ax + b$ 26-2

$\vec{y} = F(\vec{x})$

$\vec{y} \approx F(x^0) + \frac{\partial F}{\partial x} \cdot \Delta x$

$F^0 + J \cdot \Delta x$

$\Sigma_{yy} = J \cdot \Sigma_{xx} \cdot J^T$

$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} = \begin{bmatrix} \lambda \cos\theta & \lambda \sin\theta \\ -\lambda \sin\theta & \lambda \cos\theta \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$ consider x_1, x_2 constant

$\Sigma_{\begin{pmatrix} \lambda \\ \theta \end{pmatrix}} = \begin{bmatrix} \sigma_\lambda^2 & \sigma_{\lambda\theta} \\ \sigma_{\theta\lambda} & \sigma_\theta^2 \end{bmatrix}$

$Y_1 = \lambda \cos\theta X_1 + \lambda \sin\theta X_2$

$Y_2 = -\lambda \sin\theta X_1 + \lambda \cos\theta X_2$

$\begin{pmatrix} Y_1 \\ Y_2 \end{pmatrix} \approx \begin{bmatrix} \lambda^0 \cos\theta^0 \cdot X_1 + \lambda^0 \sin\theta^0 \cdot X_2 \\ -\lambda^0 \sin\theta^0 X_1 + \lambda^0 \cos\theta^0 X_2 \end{bmatrix} + \underbrace{\begin{bmatrix} \cos\theta^0 X_1 + \sin\theta^0 X_2 & -\lambda^0 \sin\theta^0 X_1 + \lambda^0 \cos\theta^0 X_2 \\ -\sin\theta^0 X_1 + \cos\theta^0 X_2 & -\lambda^0 \cos\theta^0 X_1 - \lambda^0 \sin\theta^0 X_2 \end{bmatrix}}_{J} \begin{pmatrix} \Delta\lambda \\ \Delta\theta \end{pmatrix}$

$\Sigma_{yy} = J \Sigma_{\begin{pmatrix} \lambda \\ \theta \end{pmatrix}} \cdot J^T$

Oct 26-3:26 PM

26-3

E.P. for I/O model, Q_s' rather than Σ_s'

$Q_{ll} = Q$, $W^l = Q$

$\Delta = \ldots$.

Bailing out early today - not feeling well - continue Wednesday

Oct 26-3:26 PM