ECE 530 Homework #8 (Issued Thursday 4/10, Due Thursday 4/17)
(solution will be provided -- will not be graded)

1. Text 9.1 pp. 430

2. Text 9.2 pp. 430

3. Text 9.8 pp. 430

4. Prove/disprove that the following matrix is a correlation matrix of two jointly w.s.s. random processes

\[
R = \begin{bmatrix}
    a^2 \cos \tau & 2a^2 \cos 3\tau/2 \\
    2a^2 \cos 3\tau/2 & a^2 \sin 2\tau 
\end{bmatrix}
\]

5. Consider the random process \( Y(t) = A \sin t + B \cos t \), where \( A \) and \( B \) are independent r.v. with zero means and equal variances \((\sigma^2)\). Prove/disprove the following
   (a) \( Y(t) \) is w.s.s.
   (b) \( Y(t) \) is strictly stationary.

6. Consider the random process \( X(t) = A \), where \( A \) is a r.v. uniformly distributed on \((-1, 1)\). Find the autocorrelation function and the time autocorrelation function of the random process. Is the random process ergodic?

Please have your solution readable and staple the papers.