

AM 166: Homework # 1 (due Thursday, Feb 8)

The book we refer to is Wackerly, Mendenhall & Scheaffer, *Mathematical Statistics with Applications* (6th Edition).

1. Read Sections 5.10, 7.2, 8.8, 10.8, 10.9, and Appendix ONE.

2. Suppose

$$\begin{bmatrix} Y_1 \\ Y_2 \end{bmatrix} \sim N \left(\begin{bmatrix} 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 1 & 4 \end{bmatrix} \right)$$

(a) Find the distribution of $Y_1 + 2Y_2$.

(b) Is $Y_1 + 2Y_2$ independent of $-3Y_1 + Y_2$?

3. Suppose that $Y_1 \sim N(0, 1)$ and $Y_2 \sim N(0, 4)$, and that Y_1 and Y_2 are independent. Find the distribution of

$$\begin{bmatrix} Y_1 + Y_2 \\ Y_1 - 2Y_2 \end{bmatrix}.$$

4. Suppose

$$Y = \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \end{bmatrix} \sim N \left(\begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 1 & 1 & 2 \\ 1 & 4 & 3 \\ 2 & 3 & 9 \end{bmatrix} \right)$$

(a) Find the distribution of

$$\begin{bmatrix} Y_1 \\ Y_3 \end{bmatrix}$$

(b) Find the distribution of

$$\begin{bmatrix} Y_1 + Y_2 + 2 \\ Y_2 - Y_3 - 3 \end{bmatrix}$$

5. Solve problems 8.68, 8.76, 10.53, 10.58. [Note: for Problem 10.53, it is sufficient that you give a bound on the p -value since you will not be able to get the exact p -value using the table in the textbook.]