

- (10%) 1. A total 48 percent of the women and 37 percent of the men that took a certain "quit smoking" class remained nonsmokers for at least one year after completing the class. These people then attended a success party at the end of a year. If 62 percent of the original class was male,
- (5%) (a) What percentage of those attending the party were women?
- (5%) (b) What percentage of the original class attended the party?

- (10%) 2. If X and Y are independent standard normal random variables. Let $V = X/Y$. Find the distribution of V .

- (15%) 3. Let X be a normal random variable with parameters $\mu = 0$ and $\sigma^2 = 1$, and let I , independent of X , be such that $P\{I = 1\} = 1/2 = P\{I = 0\}$. Now define Y by

$$Y = \begin{cases} X & \text{if } I = 1 \\ -X & \text{if } I = 0 \end{cases}$$

In words, Y is equally likely to equal either X or $-X$.

- (3%) (a) Are X and Y independent?
- (4%) (b) Are I and Y independent?
- (4%) (c) Find the distribution of Y ?
- (4%) (d) Find $Cov(X, Y)$?
- (15%) 4. Let $X_{(i)}$ ($i = 1, 2, \dots, n$) denote the order statistics from a set of n uniform (0,1) random variables.
- (7%) (a) Compute $Var(X_{(i)})$, $i = 1, 2, \dots, n$.
- (8%) (b) Which value of i minimizes, and which value maximizes, $Var(X_{(i)})$?

- (10%) 5. Let X_1, \dots, X_n be independent random variables with densities

$$f_{X_i}(x|\theta) = \begin{cases} e^{i\theta-x} & x \geq i\theta \\ 0 & x < i\theta \end{cases}$$

Prove that $T = \min_i (X_i / i)$ is a sufficient statistic for θ .