Name ______________________________
Student Number ____________________

Test 1
STA 347s 1991
Erindale College

All questions are worth 20 points

Tables 6.1 & 6.2 are on the last page

1. A box contains three coins. One is a two-headed coin, one is a fair coin, and one is a biased coin with P(Head)=θ. One of the coins is selected at random and tossed; it comes up heads. What is the probability that it was the two-headed coin?

2. Let S be a sample space, B be an event in S with P(B)>0, and $E_1, E_2, \ldots$ be a sequence of mutually exclusive events in S. Show that

$$P\left(\left[\bigcup_{n=1}^{\infty} E_n\right] \middle| B\right) = \sum_{n=1}^{\infty} P(E_n \mid B).$$

3. Let the continuous random variables X and Y have joint density $f_{XY}(x,y) = 2$ for $0 \le y \le x \le 1$, and zero elsewhere. Find $E[X \mid Y=y]$.

4. Let $X_1, \ldots, X_n$ be exponential (λ) random variables, and let

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n}.$$

Find the distribution of $\overline{X}$.

5. Let X be geometrically distributed with parameter p. Show that $P(X \geq n+r \mid X > r) = P(X \geq n)$; that is, the geometric distribution has "no memory".