Take home final due Dec 9, 98 between 10:10 and 11:00 in my office VinH 225

1. Let $X_1, X_2, ...$ be nonnegative independent random variables having the same distribution. Assume that $P(X_1 > 0) > 0$ (and hence $P(X_n > 0) = P(X_1 > 0) > 0$). Prove that

$$\sum_{n=1}^{\infty} X_n = \infty \quad \text{(a.s.)}.$$

(Hint: Denote the sum by Y. Prove that $Ee^{-Y} = \prod_{n=1}^{\infty} Ee^{-X_n}$ and notice that all terms in the product are the same.)

2. Chapter 9, Problems 7, 30. (Hint to 7: $X_1 \wedge X_2$ is by definition $\min(X_1, X_2)$. To find the distribution in question, compute $P(X_1 \wedge X_2 > t)$.)