Problem 1 (10 Points) Give examples of the following sequence of functions.

1. Give an example of a sequence of random variables which converges to zero at every point of the domain Ω which is $(0,1)$, but the integral of each of the functions is equal to one.

2. Give an example of a sequence of random variables which converges to zero at every point of the domain Ω which is the entire real line $\Re$, but the integral of each of the functions is equal to one.

3. Give an example of a sequence of random variables which converges to zero in probability in $(0,1)$ but does not converge to zero at any point. Show a subsequence that converges to zero everywhere.

Problem 2 (10 Points) State and derive the Chebyshev inequality.