STAT 582 Homework 3

Due date: In class on Friday, February 25, 2005

Instructor: Dr. Rudolf Riedi

9. Recall that $\sum_n \frac{1}{n} = \infty$, but $\sum_n \frac{(-1)^n}{n}$ converges. Let X_n be iid with

$$P[X_n = \pm 1] = \frac{1}{2}$$

Does $\sum_n \frac{X_n}{n}$ converge in probability? Does it converge almost surely? In L_2?

10. Let X_n be iid in L_1. Let $\bar{X}_n = (1/n)\sum_{k=1\ldots n} X_k$.

    (a) Show that $\bar{X}_n$ has uniformly bounded first moments.

    (b) Using that $Q(A) = \int_A |X_1| dP$ is absolutely continuous show that $\bar{X}_n$ is uniformly absolutely continuous.

    (c) Conclude that $\bar{X}_n$ converges in L_1.