WEAK INVARIANCE PRINCIPLE FOR THE LOCAL TIMES OF PARTIAL SUMS OF MARKOV CHAINS

ABSTRACT. Let $\{X_n\}$ be an integer valued Markov Chain with finite state space. Let $S_n = \sum_{k=0}^{n} X_k$ and let $L_n(x)$ be the number of times S_k hits $\lfloor \sqrt{n}x \rfloor$ up to step n. Our goal is to prove a functional, weak invariance principle for the normalized sequence $\frac{L_n(x)}{\sqrt{n}}$, i.e. we prove that under some assumptions about the Markov Chain, the normalized local times converge in distribution to the local time of the Brownian Motion.