## Exercise 7 for May 2nd

**Exercise.** Let  $(X_i)_{i\geq 1}$  be a sequence i.i.d. random variables with  $\mathbb{E}[X_1] = 0$ ,  $\mathbb{E}[X_1^2 \mathbbm{1}_{X_1\leq 0}] < \infty$  and  $\mathbb{P}(X_1 \geq u) \sim c/u^{\beta}$  as  $u \to \infty$  with  $\beta > 2$ . Set  $S_n = X_1 + \dots + X_n$ . Let  $(x_n)_{n\geq 1}$  be a sequence such that  $\liminf_{n\to\infty} x_n/n > 0$ . Obtain a limit theorem for  $\max(X_1, \dots, X_n)$  under  $\mathbb{P}(\cdot|S_n \geq x_n)$  as  $n \to \infty$ .