

Stochastic Processes
Problem sheet 13

Problem 1

Let $(B_t)_{t \geq 0}$ be a Brownian motion. Determine explicitly the density of $|B_t|$ for $t \geq 0$.

Problem 2

Let $(B_t)_{t \geq 0}$ be a Brownian motion and $0 < s < t < \infty$. By $\rho(s, t)$ we denote the probability that B has a root in (s, t) . Show that

$$\rho(s, t) = \frac{2}{\pi} \arccos \left(\sqrt{\frac{s}{t}} \right).$$

Hint: Decompose w.r.t. the value of B_s .

This sheet will be discussed in the problem sessions on the 14th of July.