

Name: \_\_\_\_\_ Total \_\_\_\_\_/6

## MATH 4581: STATISTICS AND STOCHASTIC PROCESSES

**Bonus problems IV****Problem 1** [2 pts] Who is the author of the text with the title 'RFBrownianMotion' in folder 'BrownianMotionInPhysics'?**Problem 2** [8 pts] Solve the exercise on page 6 of the Lectures 14 – 16 notes, assuming that each  $\xi_i$  is the Bernoulli random variable with  $p = \frac{1}{2}$ .<sup>1</sup>

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<sup>1</sup>**Hint:** let  $P_n$  be the number of paths of length  $n$  (i.e.  $X(\omega, n)$ ,  $\omega \in \Omega$ ), which do not visit the chosen number  $\ell$  and  $Q_n = 2^n$  the total number of paths of length  $n$ . Show that  $\lim_{n \rightarrow \infty} \frac{P_n}{Q_n} = 0$  (we use that each path is equally likely and has probability  $\frac{1}{2^n}$  by definition).