Mathematics 1550H – Introduction to Probability

TRENT UNIVERSITY, Summer 2015

Assignment #6

Due at the Final Exam.*

Random Walk

A fair four-sided die has its sides labelled U, D, L, and R, respectively. A token is placed at $(0, 0)$ on the Cartesian plane and the die is then rolled repeatedly. After each roll, the token is moved as follows:

Roll	Move
U	$(a, b) \to (a, b + 1)$
D	$(a, b) \to (a, b - 1)$
L	$(a, b) \to (a + 1, b)$
R	$(a, b) \to (a - 1, b)$

Let the random variable Y_n be the *taxicab distance* the token is from $(0, 0)$ after $n \geq 0$ rolls and the consequent moves. [The taxicab distance from $(0, 0)$ to (a, b) is $|a| + |b|$.]

1. What is $E(Y_n)$? Explain why as best you can. *[5]*

2. What is $V(Y_n)$? Explain why as best you can. *[5]*

* The MATH 1550H Final Exam will be 14:00–17:00 on Tuesday, 4 August, 2015, in GCS 103.