1 Homework 08

You will find all the problems for this homework in this document. You are responsible for uploading a pdf document with all of your results and the necessary work to the Canvas shell for the class. Please make sure that your homework pdf is legible, clear, and pledged.

1. For a simple random walk, M, with a "fair" coin and $N = 5$, what is
   (a) $\mathbb{P}(\tau_2 > 5)$?
   (b) $V_M^1(0, 4)$?
2. For the function $f(x) = \cos(x)$ find $V_f^1(0, 2\pi)$.
3. For the function $g(x) = xe^x$ find $V_g^1(-2, 2)$.
4. For the function $h(y) = \sin(y^2)$ find $V_h^1(-2, 2)$.
5. We have a random walk with probability of getting a heads on any toss being $\frac{1}{3}$, where the random walk is defined as

$$L(n) = \sum_{i=1}^{n} Y_i, \text{ where } Y_i = \begin{cases} 3, & \omega_i = H \\ -1, & \omega_i = T \end{cases}$$

   with $L(0) = 0$.
   (a) Express the random variable $\alpha = V_L^1(0, 4)$
   (b) What is $\mathbb{E}[\alpha]$?
   (c) What is $\mathbb{V}(\alpha)$?
6. We have a random walk with probability of getting a heads on any toss being $\frac{1}{3}$, where the random walk is defined as

$$K(n) = \sum_{i=1}^{n} Z_i, \text{ where } Z_i = \begin{cases} 2, & \omega_i = H \\ -1, & \omega_i = T \end{cases}$$

   with $K(0) = 0$.
   (a) Express the random variable $\beta = V_K^1(0, 3)$

(b) What is $\mathbb{E}[\beta]$?

(c) What is $\mathbb{V}(\beta)$?

(d) Express the random variable $\gamma = V_K^2(0, 3)$

(e) What is $\mathbb{E}[\gamma]$?

(f) What is $\mathbb{V}(\gamma)$?

