Physics 441/PCSE 503 Assignment 5

Due Date: Tuesday, November 21, 2023

1. In this question, we will consider some extensions to the **Frogger game simulation** that we studied in class.
2. Consider the case where the frog can jump both forwards and backwards. That is, at any moment, the frog can jump to any other lily pad, or all the way across the stream, or all the back to the starting point. Calculate the average number of jumps taken as a function of the number of lily pads. Explain the result that you see, either through comparison with the forward-jump-only rule result, or with a theoretical prediction for this new rule set, or both.
3. Consider the case where the frog can only jump forward, but now the probability of jumping to some lily pad (or all the way across the stream) is inversely proportional to the length of the jump. You will need to calculate a discrete probability distribution for each jump that is properly normalized. For example, if there are ten lily pads, and the frog is on lily pad six, then she has five possible jump locations: lily pads 7, 8, 9, 10, and across the stream (11)). You will need to calculate a discrete probability distribution for these five possible jump locations where the probabilities are inversely proportional to the jump distance AND is properly normalized. Compare the results of the plot of expected number of jumps as a function of the number of lily pads to the original case studied in class, and comment on the results.