Markov chains in continuous time

MathsNET
A joined up approach to
teaching and learning
mathematics

0.1 Level 1

Use the blocks below to generate an exponentially distributed random variable with parameter $\lambda = 1$. Generate 10 such random variables, X_i, and draw a graph showing in which each of your random variables is plotted at (i, X_i). Each of the is here should just be one of the set of integers between 1 and 50. This should be revision.

0.2 Level 2

Use the information from the video and the blocks below to write a program that can simulate a poisson process. Use the plotting tools to show the number of events that occur as a function of time. Click here if you want to watch the explanatory video.

0.3 Level 3

The ammount of money spent in a particular 24-hour shop can be modelled using a Compound Poisson process with parameters $\lambda = 5$, $\mu = 4$ and $\sigma^2 = 1$. Use the blocks below to draw a graph that shows the result from a simulation that models how the ammount of money spent in this shop changes as a function of time. Click here if you want to watch the explanatory video.

0.4 Level 4

Use the blocks below to write a program to model the ammount of time it takes to transition from the intial state to the final state for the sucessive states model that was discussed in the video. Generate 10 samples from this distribution and then calculate a sample mean and 80Click here if you want to watch the explanatory video.

0.5 Level 5

Use the blocks below to write a program to model the ammount of time it takes to transition from the intial state to the final state for the parallel transitions model that was discussed in the video. Generate 10 samples from this distribution and then calculate a sample mean and 80Click here if you want to watch the explanatory video.

0.6 Level 6

Use the blocks below to write a program to simulate any three state continuous time Markov chain with a stationary distirbution. Draw a histogram showing the fraction of time that is spent in each of the two states in this chain. Click here if you want to watch the explanatory video.

0.7 Level 7

Use the blocks below to write a program that simulates an M/M/1 queue. Calculate the total ammount of time each person spends waiting in the queue and getting served and plot a graph that shows how long each person spends queuing and being served in total. Click here if you want to watch the explanatory video.