EXAM C QUESTIONS OF THE WEEK

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Week of May 7/07

A stock based on the lognormal model has a current price of $100. The expected price of the stock in one year is $110. The stock pays no dividends and the volatility is 40% per year.

Use the following uniform $(0, 1)$ numbers to simulate the stock price at time 2 using the inverse transformation method.

.1 .3 .5 .7 .9

Assuming a continuously compounded risk free rate of interest of 5%, use the simulated stock price values to estimate the value at time 0 of a European call option with a strike price of 125 expiring at the end of 2 years.

The solution can be found below.

Week of May 7/07 - Solution

The simulated standard normal values are: -1.282, $-.524$, 0, $.524$, 1.282.
The stock price at time 2 is $S_2 = 100 \cdot e^{(\alpha - \frac{1}{2}\sigma^2)(2)} \cdot e^{\sigma\sqrt{2} \cdot z}$, where $100e^{\alpha} = 110$,
and $\sigma = .4$, so $S_2 = 103.11e^{.4\sqrt{2}z}$. Using the five simulated values of z, the simulated stock prices are
49.93, 76.66, 103.11, 138.69, 212.94.

The option values at time 2 based on the simulated stock prices in Question 1 are
0, 0, 0, 13.69, 87.94.
The present values at time 0 using the risk free rate of interest are
0, 0, 0, 12.39, 79.57.
The sample mean of the option values at time 0 is 18.39.