MONTE CARLO PRICING HINTS

In the risk neutral measure, the stock price follows the process:

$$\frac{dS}{S} = (r)\,dt + \sigma\, dW_t$$

This means that given the current value for ~~the~~ $\ln(S_t)$ you can simulate values for the stock price (in the risk neutral measure) as follows

$$(*) \qquad \ln S_{t+\Delta t} = \ln S_t + \left(r - \frac{\sigma^2}{2}\right)\Delta t + \sigma\sqrt{t}\, N(0,1)$$

Where $N(0,1)$ is a normally distributed random variable with mean 0 and standard deviation 1.

So you can simulate stock prices at maturity (in the risk neutral measure) by:

(i) Generating normally distributed random variables

(ii) Using (*) with Δt = Time to maturity

If you generate a large number (say 10000) stock prices, you can then price ~~the~~ an option by simply computing the expected payoff of the option.

So if you create a large spreadsheet containing 10000 ~~of~~ randomly generated stock prices, you should be able to price a call option.

Once you have put together a basic spreadsheet you might ~~[illegible]~~ consider

- Dividends. Most listed European options are on indices so its hard to find anything real to price if you can't cope with dividends.
- Puts, calls, digital options
- Path dependent options