Financial Mathematics

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[1] Based on Robert L. McDonald's *Derivatives Markets*, 3rd Ed, Pearson, 2013.

Chapter 19. Monte Carlo Valuation

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$$S_T = S_0 e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)T+\sigma\sqrt{T}Z}$$

$$S_h = S_0 e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)h+\sigma\sqrt{h}Z_1}$$

$$S_{2h} = S_h e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)h+\sigma\sqrt{h}Z_2}$$

$$\vdots \qquad \vdots$$

$$S_{nh} = S_{(n-1)h} e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)h+\sigma\sqrt{h}Z_n}$$

$$\Downarrow$$

$$S_{nh} = S_0 e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)h+\sigma\sqrt{h}\sum_{i=1}^{n} Z_i} = S_0 e^{\left(\alpha-\delta-\frac{1}{2}\sigma^2\right)h+\sigma\sqrt{T}\left[\frac{1}{\sqrt{n}}\sum_{i=1}^{n} Z_i\right]}$$

where

$$\frac{1}{\sqrt{n}}\sum_{i=1}^{n} Z_i \sim N(0,1)$$