Advanced Risk Management
Final Exam **Formula Sheet**

$$\Delta = e^{-\delta h}\ \frac{C_u - C_d}{S(u-d)} \qquad B = e^{-rh}\ \frac{uC_d - dC_u}{u-d} \qquad p^* = \frac{e^{(r-\delta)h} - d}{u-d}$$

$$C = e^{-rh}\ [p^* C_u + (1-p^*) C_d] \qquad u = e^{(r-\delta)h+\sigma\sqrt{h}} \qquad d = e^{(r-\delta)h-\sigma\sqrt{h}}$$

$$S_{t+h} = S_t e^{(r-\delta)h \pm \sigma\sqrt{h}} \qquad V(S_0,0) = \frac{1}{n} e^{-rT} \sum_{i=1}^{n} V(S_T^i, T)$$

$$C(S,K,\sigma,r,T,\delta) = Se^{-\delta T} N(d_1) - Ke^{-rT} N(d_2)$$
$$P(S,K,\sigma,r,T,\delta) = Ke^{-rT} N(-d_2) - Se^{-\delta T} N(-d_1)$$

$$d_1 = \frac{\ln(S/K) + (r - \delta + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}} \qquad d_2 = d_1 - \sigma\sqrt{T}$$

$$C(S_{t+h}, T-t-h) = C(S_t, T-t) + \varepsilon\Delta(S_t, T-t) + \frac{1}{2}\varepsilon^2\Gamma(S_t, T-t) + h\theta(S_t, T-t)$$

$$N(a) \equiv \int_{-\infty}^{a} \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} dx \qquad E(S_t) = S_0 e^{(\alpha-\delta)t}$$

If $x \sim N(\mu, \sigma^2)$ then $z \sim N(0,1)$ when $z = \frac{x-\mu}{\sigma}$

$$S_t^L = S_0 e^{(\alpha-\delta-\frac{1}{2}\sigma^2)t + \sigma\sqrt{t}N^{-1}(p/2)} \qquad S_t^U = S_0 e^{(\alpha-\delta-\frac{1}{2}\sigma^2)t - \sigma\sqrt{t}N^{-1}(p/2)}$$

$$A(T) = \frac{1}{N}\sum_{i=1}^{N} S_{ih} \qquad G(T) = (S_h \times S_{2h} \times \ L \ \ \times S_{Nh})^{1/N}$$