Midterm Exam #1 Formula Sheet

Pricing Forwards

$$F(t,T) = V(t)e^{r(T-t)}, \text{ where}$$

$F(t,\ T)$ = today's (date t) price for a forward contract that matures at date T;
r = annualized (U.S.) riskless rate of interest; and
$V(t)$ = today's (date t) value of the underlying asset.

$V(t)$ for stock with a discrete dividend:

$$V(t) = S(t) - PV(D), \text{ where}$$

$S(t)$ = today's (date t) price of the underlying stock;
r = annualized riskless rate of interest; and
$PV(D)$ = present value of dividend payments received between date t and date T.

$V(t)$ for stock with a continuous dividend yield:

$$V(t) = S(t)e^{-\delta(T-t)}, \text{ where}$$

δ corresponds to the annualized continuous dividend yield.

Bounds for European and American Calls & Puts (Non-Dividend Paying Stock):

$$S(t) \geq c(t,T) \geq max[0, S(t) - Ke^{-r(T-t)}]; \text{ and}$$
$$Ke^{-r(T-t)} \geq p(t,T) \geq max[0, Ke^{-r(T-t)} - S(t)], \text{where}$$

$c(t,\ T)$ = date t price for a call option that expires at date T; and
$p(t,\ T)$ = date t price for a put option that expires at date T.

Replicating portfolio approach to option pricing:

$$\text{At inception: } V_{RP}(t) = \Delta S(t) + \beta B(t),$$
$$\text{At expiration: } V_{RP}(T) = \Delta S(T) + \beta B(T), \text{ where}$$

$V_{RP}(t)$ = date t value of the replicating portfolio;
$V_{RP}(T)$ = date T value of the replicating portfolio;
Δ = number of shares;
β = number of bonds;
$B(t)$ = date t value of one bond; and
$B(T)$ = date T value of one bond.

Put-call parity equation for a non-dividend paying stock

$$c(t,T) + Ke^{-r(T-t)} = p(t,T) + S(t).$$