long option is **bought** — Initial Cost: $V(0)$ (premium)

short/write an option is **sold** — $-V(0)$

Always: **Profit = Payoff − FV(Initial Cost)**

$S(0)=100$, $K=105$, $T=0.5$, $u=1.3$, $d=0.8$ — put

$\frac{1}{2}$

$S_u = 130$ — $V_u = 0$ — $V_u = (105-130)_+ = 0$

$S(0)=100$ — p^* — $1-p^*$

$S_d = 80$ — $V_d = 25$ — $V_d = (K-S_d)_+$, $V_d = (105-80)_+ = 25$

(b) $\Delta = \frac{V_u - V_d}{S_u - S_d} = \frac{0-25}{130-80} = -\frac{1}{2}$ ✓

(c) $B = e^{-rh} \cdot \frac{u \cdot V_d - d \cdot V_u}{u-d} = e^{-0.08(\frac{1}{2})} \cdot \frac{1.3 \cdot (25) - 0.8(0)}{1.3-0.8} = 62.45$

(a) $V_p(0) = \Delta \cdot S(0) + B = -\frac{1}{2} \cdot (100) + 62.45 = -50 + 62.45 = 12.45$

alternative:

$p^* = \frac{e^{0.08(0.5)} - 0.8}{1.3-0.8} = 0.48$

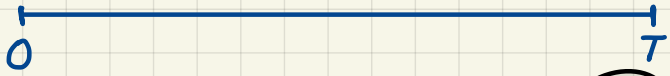
$V_p(0) = e^{-0.08(0.5)} \cdot (1-p^*) \cdot 25 = 12.45$

2.5. $S(0) = 100$

$F_{0,T_F} = 101.26$ $\qquad T_F = 0.25$

put, $K = 90$, $T_p = 0.5$, $V_p(0) = 2.22$,

$S(T_p) = 96$ $\qquad$ profit = ?



Long Forward $\qquad S(T) - F$

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outright purchase	$S(0)$	$S(T)$
borrow $PV(F)$	$-PV(F)$	$-F$

$\Big\}$ $S(T) - F$ replicating portfolio for a forward contract

$S(0) - PV(F) = \text{Initial Cost(Forward)} = 0$

$S(0) - PV(F) = 0$

$S(0) = PV(F)$

$F = FV(S(0)) = S(0)e^{rT_F}$

In this problem: $101.26 = 100\, e^{0.25r}$

$e^{0.25r} = \frac{101.26}{100} = 1.0126$ ✓

Profit (Put) = Payoff (Put) − FV(Init. Cost) (Put)

$= (90 - 96)_+ - 2.22 \cdot e^{0.5r} = 0 - 2.22(1.0126)^2 =$ _____