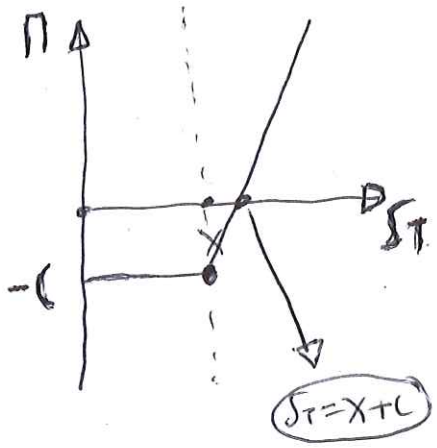
CALL

$\Pi: \max(S_T - X, 0) - C$

$S_T < X$: $-C$

$S_T > X$: $S_T - X - C$

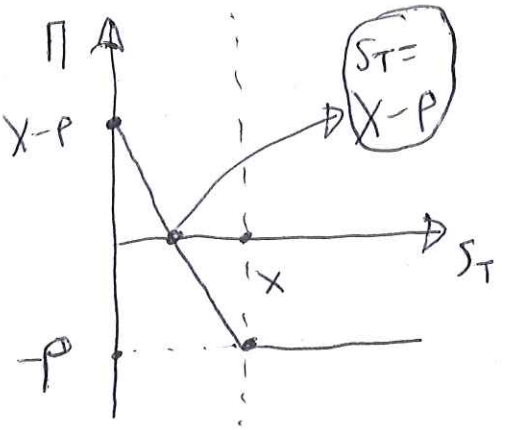


PUT

$\Pi: \max(X - S_T, 0) - P$

$S_T < X$: $X - S_T - P$

$S_T > X$: $-P$



COV CALL

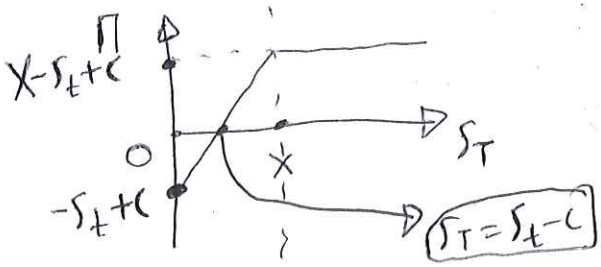
$l_P S_t, S_P C$

$\Pi: S_T - \max(X - S_T, 0) - S_t + C$

$S_T < X$: $S_T - S_t + C$

$S_T > X$: $S_T - (X - S_T) - S_t + C =$

$X - S_t + C$



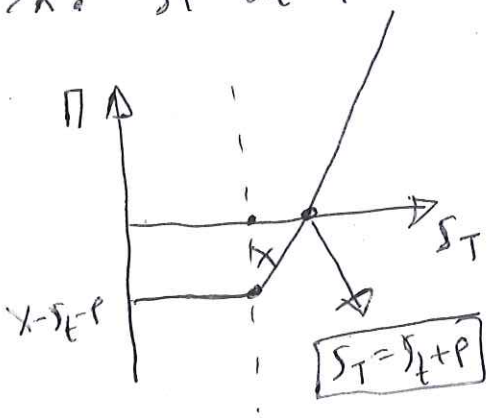
PROT. PUT

$l_P S_t, l_P P$

$\Pi: S_T + \max(X - S_T, 0) - S_t - P$

$S_T < X$: $X - S_t - P$

$S_T > X$: $S_T - S_t - P$



SPREADS

BULL SPREAD

$lp(X_1)$, $sp(X_2)$ $\quad X_2 > X_1$

$C_2 < C_1$

Π: $\max(S_T - X_1, 0)$ $\max(S_T - X_2, 0)$ $\quad -C_1 + C_2$

$S_T < X_1$: $\quad -(C_1 + C_2$

$X_1 < S_T < X_2$: $\quad S_T - X_1 \quad -C_1 + C_2$

$X_2 < S_T$: $\quad S_T - X_1 - (S_T - X_2) \quad -C_1 + C_2 =$

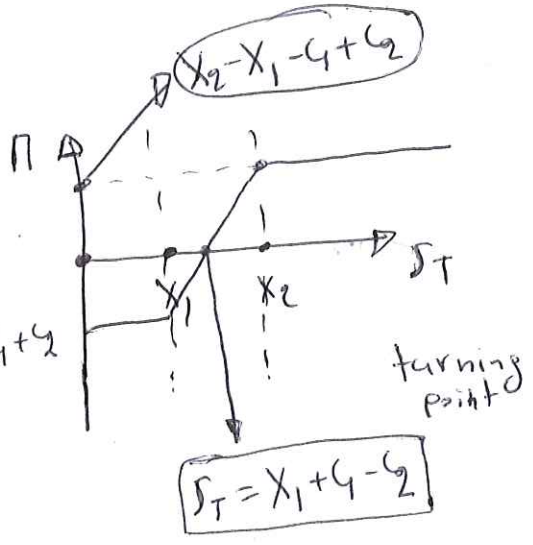
$X_2 - X_1 \quad -C_1 + C_2$

Thus

$S_T < X_1$: $-C_1 + C_2$

$X_1 < S_T < X_2$: $S_T - X_1 - C_1 + C_2$

$X_2 < S_T$: $X_2 - X_1 - C_1 + C_2$



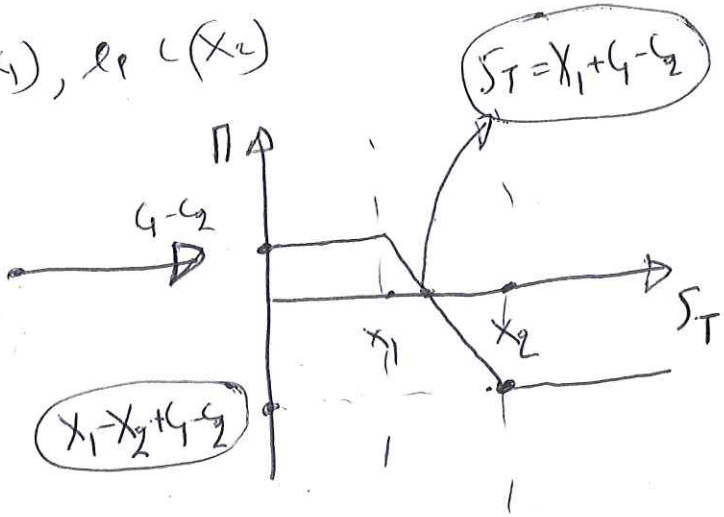
BEAR SPREAD

$sp(X_1)$, $lp(X_2)$

$S_T < X_1$: $C_1 - C_2$

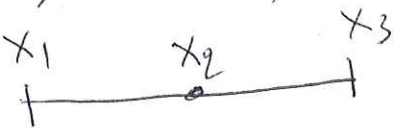
$X_1 < S_T < X_2$: $X_1 - S_T + C_1 - C_2$

$X_2 < S_T$: $X_1 - X_2 + C_1 - C_2$



BUTTERFLY SPREAD

$$\left[l_p\, c(X_1),\ 2\, s_p\, c(X_2),\ l_p\, c(X_3) \right]$$



$$2X_2 = X_1 + X_3$$

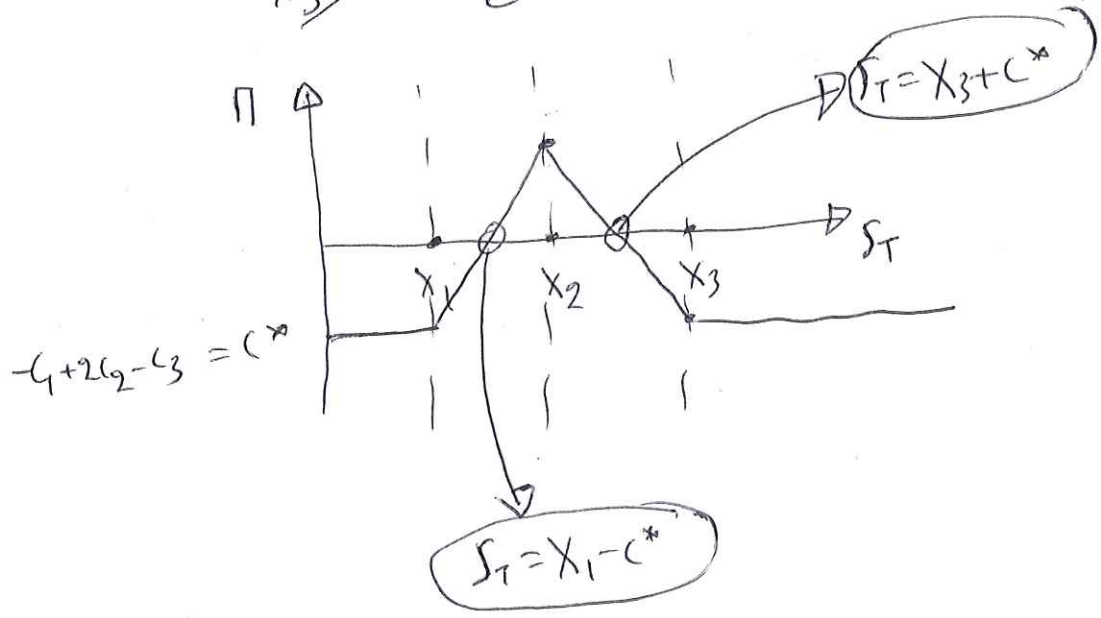
$$\Pi: \max(S_T - X_1, 0) - 2\max(S_T - X_2, 0) + \max(S_T - X_3, 0) \overbrace{- C_1 + 2C_2 - C_3}^{C^*}$$

$S_T < X_1$: $\quad + C^*$

$X_1 < S_T < X_2$: $\quad S_T - X_1 \quad + C^*$

$X_2 < S_T < X_3$: $\quad \underbrace{S_T - X_1 - 2(S_T - X_2)}_{X_3 - S_T} \quad + C^*$

$X_3 < S_T$: $\quad \underbrace{S_T - X_1 - 2(S_T - X_2)}_{\cancel{X_3 - S_T}\ 0} + \cancel{(S_T - X_3)} \quad + C^*$



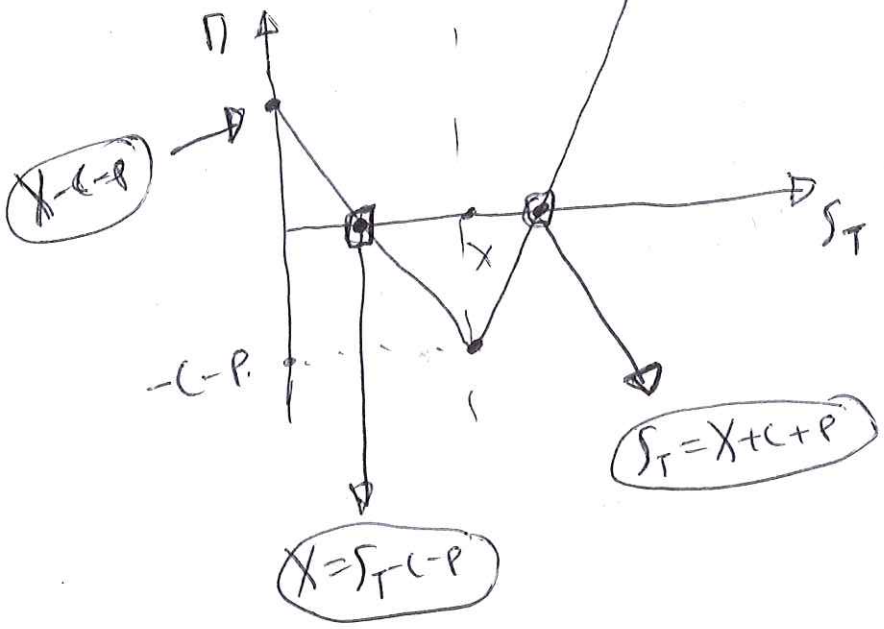
STRADDLE

$l_P\ C(X)$, $l_P\ P(X)$.

$$\Pi: \max(S_T - X, 0) + \max(X - S_T, 0) - C - P$$

$S_T < X$: $X - S_T$ $\quad -C-P$

$S_T > X$: $S_T - X$ $\quad -C-P$



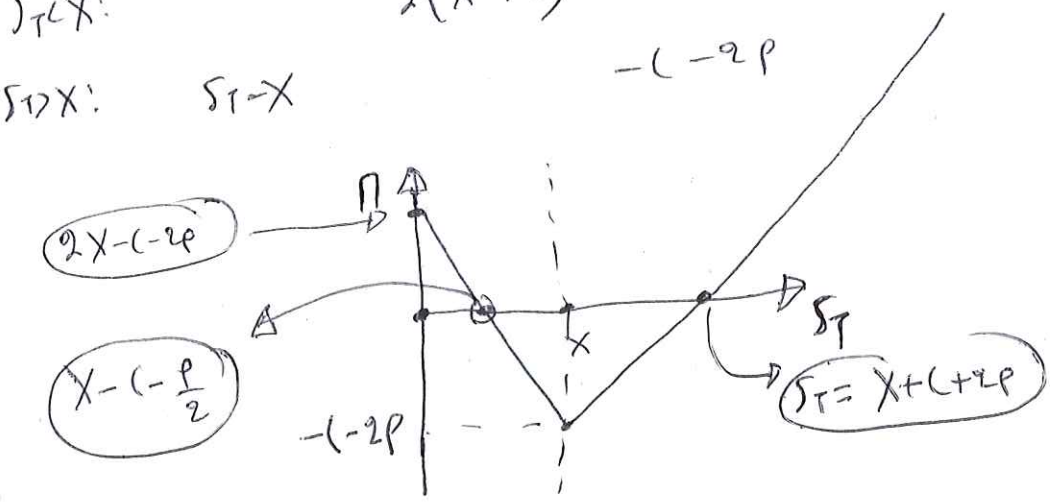
STRIP

$l_P\ C(X)$, $2\,l_P\ P(X)$.

$$\Pi: \max(S_T - X, 0) + 2\max(X - S_T, 0) - C - 2P$$

$S_T < X$: $2(X - S_T)$ $\quad -C-2P$

$S_T > X$: $S_T - X$ $\quad -C-2P$



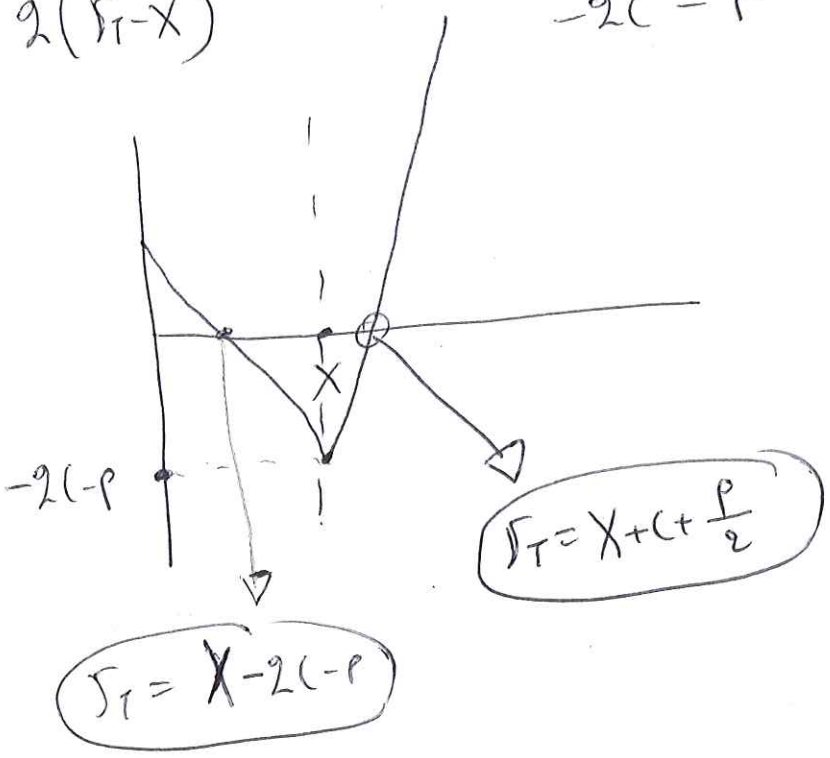
$\boxed{\text{STPAP}}$

$\boxed{2\,\text{lp}\ c(x),\ \text{lp}\ p(x)}$

$$\Pi: \ 2\max(S_T - X, 0) + \max(X - S_T, 0) - 2c - p$$

$S_T < X$: $\quad X - S_T - 2c - p$

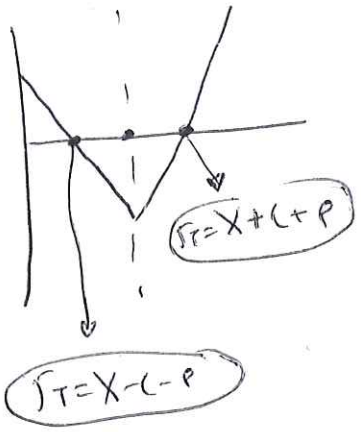
$S_T > X$: $\quad 2(S_T - X) \quad -2c - p$



STRADDLE

$S_T < X$: $X - S_T - C - P$

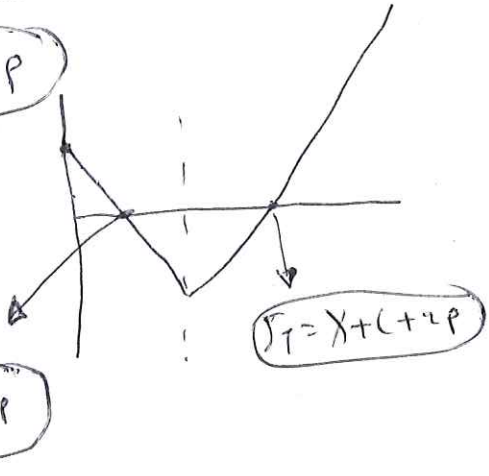
$S_T > X$: $S_T - X - C - P$



STRIP

$S_T < X$: $2(X - S_T) - C - 2P$

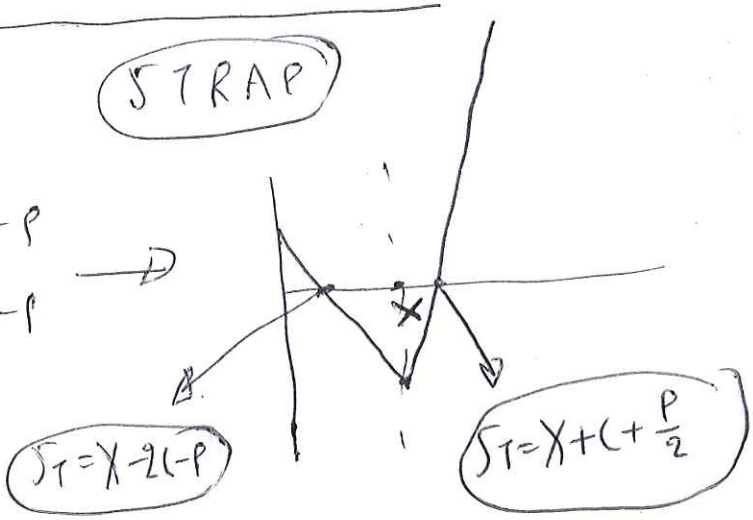
$S_T > X$: $S_T - X - C - 2P$



STRAP

$S_T < X$: $X - S_T - 2C - P$

$S_T > X$ $2(S_T - X) - 2C - P$



STRANGLE

$lp\,C(X_2)$, $lp\,P(X_1)$ $\quad (X_2 > X_1)$

Π: $\max(S_T - X_2, 0) + \max(S_T - X_1, 0) - C - P$

$S_T < X_1$: $\quad S_T - X_1 \quad - C - P$

$X_1 < S_T < X_2$: $\quad - C - P$

$X_2 < S_T$: $\quad S_T - X_2$

STRANGLE

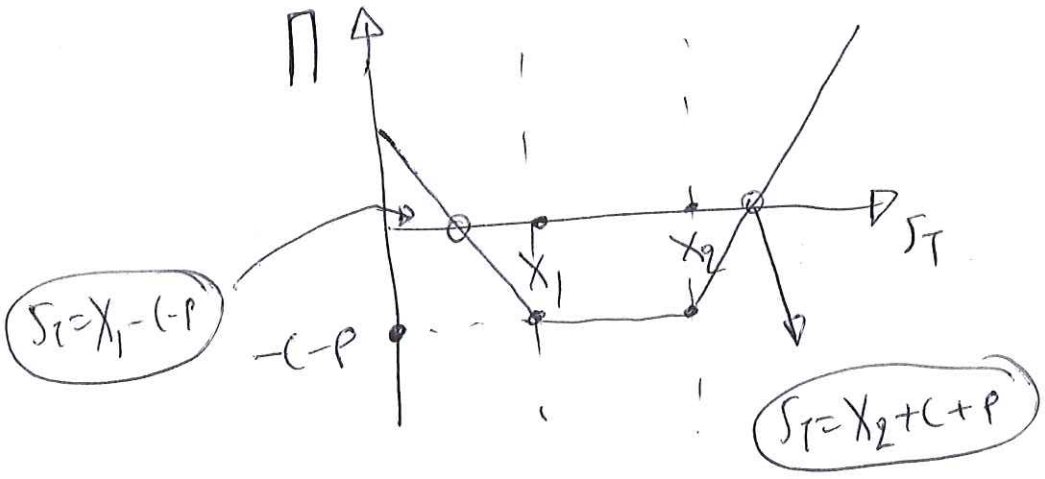
$l_p(X_2)$, $l_p P(X_1)$ $\quad X_2 > X_1$

Π: $\max(S_T - X_2, 0) + \max(X_1 - S_T, 0) - C - P$

$S_T < X_1$: $\quad X_1 - S_T \quad -C-P$

$X_1 < S_T < X_2$: $\quad -C-P$

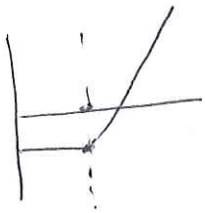
$X_2 < S_T$: $\quad S_T - X_2 \quad -C-P$



CALL

$S_T < X$: $-C$

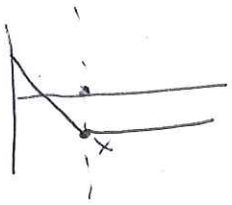
$S_T > X$: $S_T - X - C$



PUT

$S_T < X$: $X - S_T - P$

$S_T > X$: $-P$

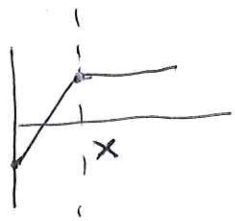


COV CALL

lp S_t, sp C

$S_T < X$: $S_T - S_t + P$

$S_T > X$: $X - S_t + P$

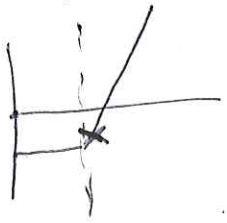


PROT PUT

lp S_t, lp P

$S_T < X$: $X - S_t - P$

$S_T > X$: $S_T - S_t - P$



It's like a call

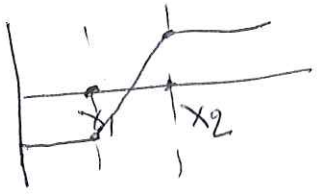
BULL SPREAD

lp $C(X_1)$, sp $C(X_2)$ $X_2 > X_1$

$S_T < X_1$: $-C_1 + C_2$

$X_1 < S_T < X_2$: $S_T - X_1 - C_1 + C_2$

$X_2 < S_T$: $X_2 - X_1 - C_1 + C_2$

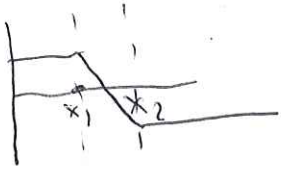


BEAR SPREAD

$C_1 - C_2$

$X_1 - S_T + C_1 - C_2$

$X_1 - X_2 + C_1 - C_2$



BUTTERFLY SPREAD

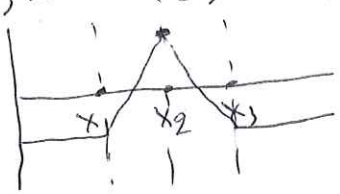
lp $C(X_1)$, 2sp $C(X_2)$, lp $C(X_3)$ $\Rightarrow 2X_2 = X_1 + X_3$

$S_T < X_1$: C^*

$X_1 < S_T < X_2$: $S_T - X_1 + C^*$

$X_2 < S_T < X_3$: $X_3 - S_T + C^*$

$\longrightarrow$

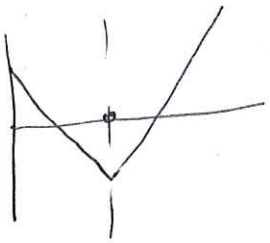


STRADDLE

$1p\,C(X),\ 1p\,P(X)$

$S_T < X$: $X - S_T - C + P$

$S_T > X$: $S_T - X - C + P$

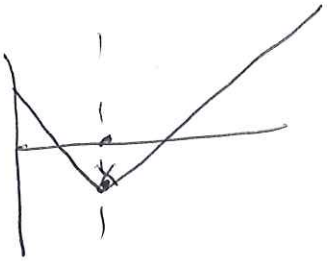


STRIP

$1p\,C(X),\ 2p\,P(X)$

$S_T < X$: $2(X - S_T) - C + 2P$

$S_T > X$: $S_T - X - C + 2P$

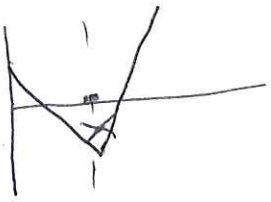


STRAP

$2p\,C(X),\ 1p\,P(X)$

$S_T < X$: $X - S_T - 2C + P$

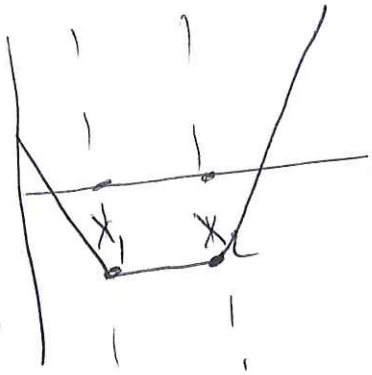
$S_T > X$: $2(S_T - X) - 2C + P$



STRANGLE

$1p\,C(X_2),\ 1p\,P(X_1)$ $\quad X_2 > X_1$

$S_T < X_1$: $X_1 - S_T - C + P$

$X_1 < S_T < X_2$: $-C + P$

$X_2 < S_T$: $S_T - X_2 - C + P$