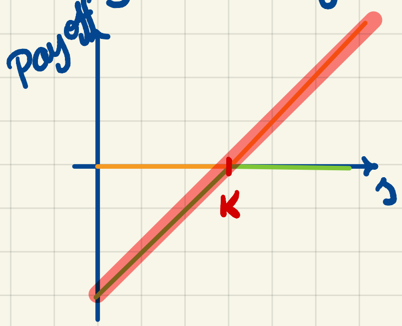
Put·Call Parity [cont'd].

$$\boxed{V_C(0) - V_P(0) = S(0) - PV_{0,T}(K)}$$

More generally: for any $t \in [0,T]$:

$$\boxed{V_C(t) - V_P(t) = S(t) - PV_{t,T}(K)}$$

Remarks:
- The no·arbitrage assumption is sufficient.
- Only works for European options.
- 

With portfolio A, we constructed a replicating portfolio for an "off·market forward"

aka a "synthetic forward".

Special Case: strike = forward price on the stock

$$\Longleftrightarrow$$

$$K = F_{0,T}(S) = S(0)e^{rT}$$

$$\Longleftrightarrow$$

$$PV_{0,T}(K) = S(0)$$

$$\Longleftrightarrow$$

$$\boxed{V_C(0) - V_P(0)} = 0 = S(0) - PV_{0,T}(K)$$

$$\Longleftrightarrow$$

$$\boxed{V_C(0) = V_P(0)}$$ By put·call Parity

1. Consider a European call option and a European put option on a nondividend-paying stock. You are given:

(i) The current price of the stock is 60.

(ii) The call option currently sells for 0.15 more than the put option. $V_c(0) - V_p(0) = 0.15$

(iii) Both the call option and put option will expire in 4 years.

(iv) Both the call option and put option have a strike price of 70.

Calculate the continuously compounded risk-free interest rate.

(A) 0.039

(B) 0.049

(C) 0.059

(D) 0.069

(E) 0.079

$\boxed{r = ?}$

Put-Call Parity:

$$V_c(0) - V_p(0) = S(0) - PV_{0,T}(K)$$

$$V_c(0) - V_p(0) = S(0) - Ke^{-rT}$$

$$Ke^{-rT} = S(0) - V_c(0) + V_p(0)$$

$$e^{-rT} = \frac{1}{K}(S(0) - V_c(0) + V_p(0))$$

ln |

$$-rT = \ln\left(\frac{S(0) - V_c(0) + V_p(0)}{K}\right)$$

$$\boxed{r = -\frac{1}{T}\ln\left(\frac{S(0) - V_c(0) + V_p(0)}{K}\right)}$$

In this problem:

$$r = -\frac{1}{4}\ln\left(\frac{60 - 0.15}{70}\right) = 0.03916$$

77. You are given:

i) The current price to buy one share of XYZ stock is $\boxed{500}$.

ii) The stock does not pay dividends.

iii) The continuously compounded risk-free interest rate is 6%.

iv) A European call option on one share of XYZ stock with a strike price of *K* that expires in one year costs $\boxed{66.59}$.

$T=1$

v) A European put option on one share of XYZ stock with a strike price of *K* that expires in one year costs $\boxed{18.64}$.

Using put-call parity, calculate the strike price, *K*.

→:

$$V_c(0) - V_p(0) = S(0) - PV_{0,T}(K)$$

$$66.59 - 18.64 = 500 - Ke^{-0.06}$$

$$Ke^{-0.06} = \underbrace{500 - 66.59 + 18.64}_{452.05}$$

$$K = 452.05e^{0.06} = \underline{480.0032}$$

(A) 449

(B) 452

(C) 480

(D) 559

(E) 582

78. The current price of a non-dividend paying stock is 40 and the continuously compounded risk-free interest rate is 8%. You are given that the price of a 35-strike call option is $\boxed{3.35}$ higher than the price of a 40-strike call option, where both options expire in 3 months.

Calculate the amount by which the price of an otherwise equivalent 40-strike put option exceeds the price of an otherwise equivalent 35-strike put option.

→:

$$V_c(0, K_1=35) - V_p(0, K_1=35) = \cancel{S(0)} - 35e^{-0.08(0.25)}$$

$$-\;V_c(0, K_2=40) + V_p(0, K_2=40) = \cancel{S(0)} + 40e^{-0.02}$$

$$3.35 + \boxed{(V_p(0, K_2=40) - V_p(0, K_1=35))} = 5e^{-0.02}$$

$$\text{answer} = 5e^{-0.02} - 3.35 = \underline{1.55}$$

(A) 1.55

(B) 1.65

(C) 1.75

(D) 3.25

(E) 3.35