# M339D: February 18th, 2022.

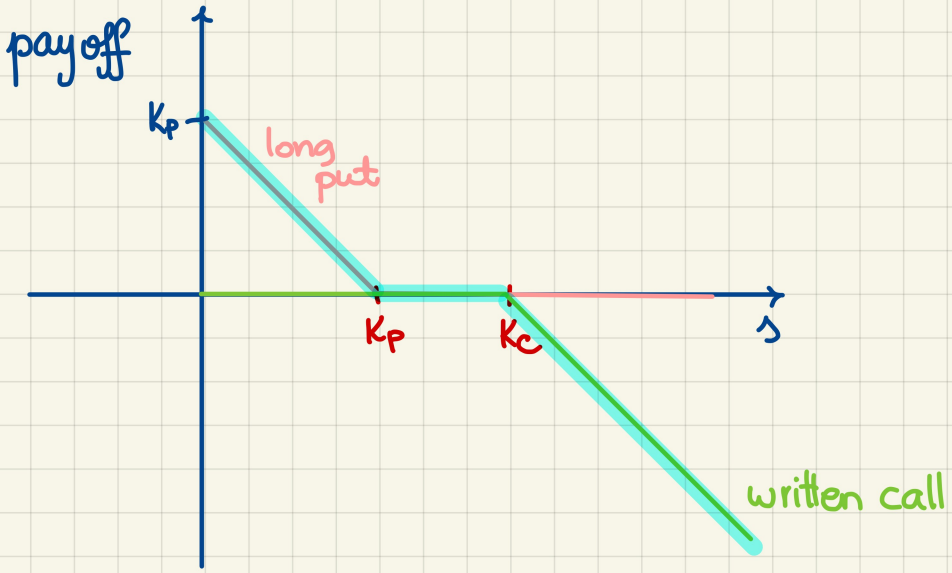
## Collars.

**Def'n.** A collar is a financial position which consists of:

- a long put option
- a written call option

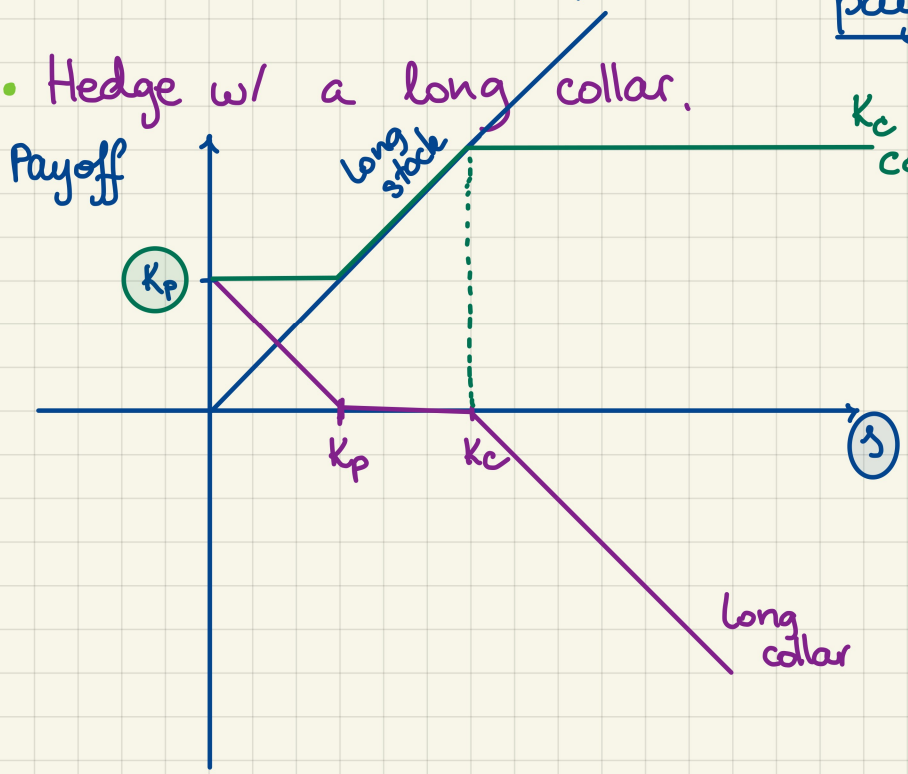
} $K_P \leq K_C$

w/ the same underlying asset, and the same exercise date.




## Collared Stock.

- Start w/ a long position in the non-dividend-paying stock.
- Hedge w/ a long collar.




Range of payoff:

$[K_P, K_C]$

## Derivative Securities.

... have a value which is contingent on the value of another traded asset.

**Examples.**

- **Forward contract:**

  Payoff: $S(T) - F$ ✓

- **European call option:**

  Payoff: $V_C(T) = (S(T) - K)_+$ ✓

- **European put option:**

  Payoff: $V_P(T) = (K - S(T))_+$ ✓

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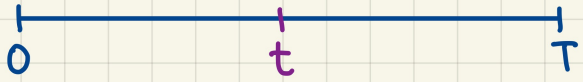



option written — the expiration date

We can observe $S(t)$ during the life of the option.

$\{S(t),\ 0 \le t \le T\} \longmapsto$ PAYOFF

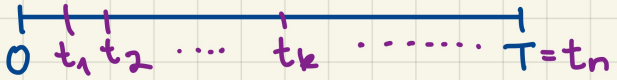
**Example.**

- **Student Example:**

$$V(T) = \begin{cases} 1 & \text{if } S(T) > S(0) \\ 0 & \text{if } S(T) \le S(0) \end{cases}$$ ✓

happens to be a cash call option

- Base the payoff on the average behavior of the stock price.




$S(t_1), S(t_2), \ldots, S(t_k), \ldots, S(T)$

For instance, we can calculate the arithmetic average:

$$\frac{1}{n}\sum_{i=1}^{n} S(t_i)$$

For example, the payoff of your option could be defined as:

$$\left(\frac{1}{n}\sum_{i=1}^{n} S(t_i) - K\right)_+$$

This is an example of an Asian option.

- Consider:
  - the minimum obsewed stock price:

$$m(T) := \min_{0 \le t \le T} S(t)$$

  - the maximum obsewed stock price:

$$M(T) := \max_{0 \le t \le T} S(t)$$