Other Payouts

As discussed in class, the option price for a bullish spread is

$$V_{\text{bull}} = C(K_b, t) - C(K_s, t), \quad K_s > K_b.$$ 

The payoff diagram is shown below. (All the plots in this section have $\sigma = 0.2$.)

![Payoff diagram for bullish spread option vs. S for $\sigma = 0.2$, $T = 1$, $r = 0.05$, $K_b = 2.5$, $K_s = 3.5$. In increasing order of thickness: $\tau = 0, 1/3, 2/3, 1$.]

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The option price for a bearish spread is

$$V_{\text{bear}} = P(K_b, t) - P(K_s, t), \quad K_s < K_b.$$  

The payoff diagram is shown below.

Payoff of bearish spread option vs. $S$ for $\sigma = 0.2$, $T = 1$, $r = 0.05$, $K_b = 3.5$, $K_s = 2.5$. In increasing order of thickness: $\tau = 0, 1/3, 2/3, 1$.

The option price for a straddle option is

$$V_{\text{straddle}} = C(K, t) + P(K, t).$$  

The payoff diagram is shown below.

Payoff of straddle option vs. $S$ for $\sigma = 0.2$, $T = 1$, $r = 0.05$. In increasing order of thickness: $\tau = 0, 1/3, 2/3, 1$. 
The option price for a symmetric butterfly option is

\[ V_{\text{butterfly}} = C(K_-, t) + C(K_+, t) - 2C((K_- + K_+)/2, t), \quad K_- < K_+. \]

The payoff diagram is shown below.

Payoff of butterfly option vs. \( S \) for \( \sigma = 0.2, T = 1, r = 0.05, K_+ = 3.5, K_- = 2.5. \)
In increasing order of thickness: \( \tau = 0, 1/3, 2/3, 1. \)