Put-Call Parity

As discussed in class, the option price for a European put is given by

\[ V_{\text{put}} = V_{\text{call}} + Ke^{-r(T-t)} - S. \]

The payoff diagram is shown below.

Payoff of put (dash) and call (dot) options vs. \( S \) for \( K = 3 \).
Here are the diagrams of $V_{\text{put}}$ vs. the stock price and the asset price. Here we use a larger volatility of $\sigma = 0.5$ to illustrate the behavior better. Note that in contrast to the call option, the put option can increase in value over time if highly in the money. (This fact will become important later on.)

Graph of $V_{\text{put}}$ vs. $S$ for $K = 3$, $\sigma = 0.5$, $T = 1$, $r = 0.05$. In increasing order of thickness: $\tau = 0, 1/3, 2/3, 1$.

Graph of $V_{\text{put}}$ vs. $K$ for $S = 3$, $\sigma = 0.5$, $T = 1$, $r = 0.05$. In increasing order of thickness: $\tau = 0, 1/3, 2/3, 1$. 