1. We consider a market with one risky asset $S$ and a riskless asset $B$

\[
\begin{align*}
    dS &= (m-S)\,dt + \sigma dW \\
    dB &= rdt
\end{align*}
\]

where $m, \sigma, r$ are positive constants. Let $C$ be a European call on $S$, with exercise price $K$ and exercise time $T$. Evaluate numerically its price $C_0$, using

\[
\begin{align*}
    m &= 6, \sigma = .1, r = 3 \\
    S_0 &= 7, K = 6, \ T = 1, 10, 100
\end{align*}
\]

2. In the same market, we consider the terminal-wealth problem:

\[
\begin{align*}
    \max E_P \left[ u \left( \tilde{X}_T B_T \right) \right] \\
    d\tilde{X}_t &= h_t d\tilde{S}_t \\
    \tilde{X}_0 &= x
\end{align*}
\]  

(1)

with $u(x) = -e^{-x}$. Compute the optimal value.