

Problem 2 Answer

$$\begin{aligned}\frac{\partial C}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 C}{\partial S^2} + rS \frac{\partial C}{\partial S} - rC &= 0 \\ \frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \left(\frac{\partial^2 V}{\partial X^2} - \frac{\partial V}{\partial X} \right) + rS \frac{\partial V}{\partial X} - rV &= 0 \\ \frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 \frac{\partial^2 V}{\partial X^2} - \frac{1}{2}\sigma^2 \frac{\partial V}{\partial X} + r \frac{\partial V}{\partial X} - rV &= 0 \\ \frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 \frac{\partial^2 V}{\partial X^2} + \left(r - \frac{1}{2}\sigma^2\right) \frac{\partial V}{\partial X} - rV &= 0\end{aligned}$$