10. Solve the stochastic differential equation
\[ dX(t) = X(t) \left( \frac{1}{2} b^2 - a \log X(t) \right) dt + bX(t) dW(t) \quad \text{(Ito)} \]
with \( X(0) = x_0 \) a.s. and \( a, b > 0 \), using the substitution \( Y(t) = \log X(t) \).

11. Let \( X(t) \) be a solution of the stochastic differential equation
\[ dX = g(X, t) dW \quad \text{(Ito)} \]
Calculate the time-derivative of \( Y(t) = h(X(t), W(t)) \).

12. Consider the stationary stochastic processes \( X(t) \) and \( Y(t) \), both with zero mean, and \( Z(t) = aX(t) + bY(t) \), and show that
(a) \( C_{Z,Z}(\tau) = a^2 C_{X,X}(\tau) + ab C_{X,Y}(\tau) + ab C_{Y,X}(\tau) + b^2 C_{Y,Y}(\tau) \).
(b) \( C_{X,Y}(\tau) = C_{Y,X}(\tau) \).
(c) \( C_{X,Y}(\tau) = C_{X,Y}'(\tau) \).
(d) \( C_{X,Y}(\tau) = -C_{Y,X}'(\tau) \).
(e) \( C_{X,Y}(\tau) = -C_{X,Y}''(\tau) \).

where \( \dot{X} \) and \( \dot{Y} \) are the time-derivatives of \( X(t) \) and \( Y(t) \), and where \( C_{X,Y}'(\tau) \) and \( C_{X,Y}''(\tau) \) are, respectively, the first- and second-order derivatives of the cross-covariance function \( C_{X,Y}(\tau) \).