1. Solve \( u_t + (\cosh x)^{-1}u_x = 0 \); \( u(0, x) = \sinh x \) for \( t < 0 \) and \( t > 0 \).

2. If \( b(x) \) is a smooth function and \( F(s, t, x) \) is the solution of

\[
\frac{dF(t, x)}{dt} = b(F(t, x)); F(s, x) = x
\]

then show that the solution of

\[
\frac{\partial u(t, x)}{\partial t} + b(x)\frac{\partial u(t, x)}{\partial x} = g(t, x); u(T, x) = f(x)
\]

is given by

\[
u(t, x) = - \int_t^T g(\tau, F(t, \tau, x))d\tau + f(F(t, T, x))
\]