Start reading Chapter 7 in Fetter and Walecka.

1. Suppose that you have a very long uniform wire stretched along the x-axis with constant tension. To a very good approximation, transverse waves are described by vertical displacements (with respect to equilibrium) by a function $f(x,t)$ which satisfies a wave equation
\[ \frac{\partial^2 f}{\partial t^2} = c^2 \frac{\partial^2 f}{\partial x^2}. \]  
(1)

In this equation, $c$ represents a known constant which depends on the tension and the mass per unit length of the wire. Also suppose that the following initial value information is known:
\[ f(x,t)|_{t=0} = 0. \]  
(2)
\[ \frac{\partial f(x,t)}{\partial t} \bigg|_{t=0} = -\frac{\sinh(x)}{\cosh^2(x)}. \]  
(3)

(a) Use Maple or other software to plot $f(x,t)|_{t=0}$ and $\frac{\partial f(x,t)}{\partial t} \bigg|_{t=0}$.

(b) Find the analytic form of $f(x,t)$ for some $t > 0$.

(c) Use Maple or other software to plot $f(x,t)$ and $\frac{\partial f(x,t)}{\partial t}$ for at least two values of $t > 0$. 