Sec. 1.4.1

1) \( \frac{dx}{dt} = \frac{x}{1+t^2} = f(t,x) \)
   
   \( f \) is cont for all \( t \neq x \)
   
   \( \frac{\partial f}{\partial x} = \frac{1}{1+t^2} \) is cont for all \( t \neq x \)
   
   There exists a unique solution for all \( t \neq x \)

2) \( \frac{dx}{dt} = \frac{t-x}{3t-7x} = f(t,x) \)
   
   \( f \) is discont when \( x = \frac{3}{7}t \)
   
   \( \frac{\partial f}{\partial x} = \frac{4t}{(3t-7x)^2} \) is also discont when \( x = \frac{3}{7}t \)
   
   There exists a unique solution away from the line \( x = \frac{3}{7}t \).
   
   Along that line either existence or uniqueness fails.