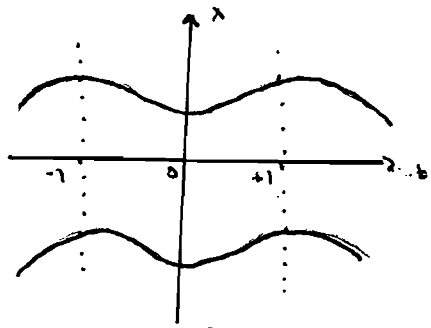
MATH 2343 2343-1p4.gif

S&C: Sec 1.4

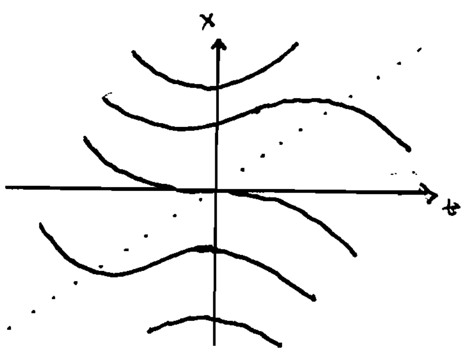
2) $\frac{dx}{dt} = t(1-t^2) = f(t)$

- f is a function of only t. Each curve is the same for all x.
- $f = 0$ when $t = 0, \pm 1 \Rightarrow 0$ slope



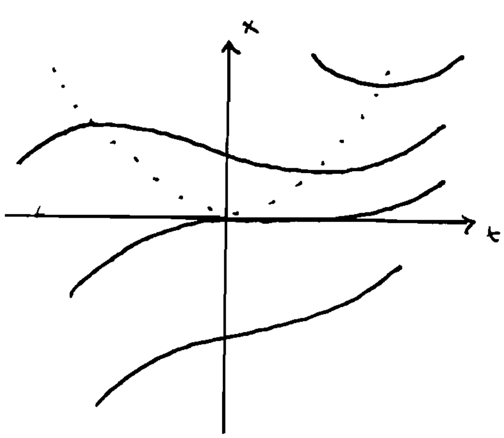
4) $\frac{dx}{dt} = t(x-t) = f(t,x)$

$f = 0$ when $t = 0$ & $x = t$



6) $\frac{dx}{dt} = t^2 - x = f(t,x)$

$f = 0$ when $x = t^2$



Sec. 1.4.1

1) $\frac{dx}{dt} = \frac{x}{1+t^2} = f(t,x)$

f is cont for all t & x

$\frac{\partial f}{\partial x} = \frac{1}{1+t^2}$ is cont for all t & x

$\therefore$ There exists a unique solution for all t & 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.