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by the lemma & has a solution > 3 has a fixedpt x\*=T(x\*) Strategy - Picard iteration start w/ uo(t) define with = T(uj) if this has a limit ce; -> x\* = co then by lemma 1 it solves @ example & x = rx  $\frac{2 \times (61 = x)}{Tu = x_0 + \int_0^T - u(s) ds}$ Lt  $u_0 = x_0$   $u_1 = x_0 + \int_0^t x_0 ds = x_0(1+t)$ u2 = x0+r Jx0(1+5) Us = x0(1+rt+ = 2/2) -> Xoert exercise try a bad guess, eg xo=t Show it still converges To us Picard iteration, need to restrict to 4 the space of us.t. |flux bounded so & In order to use contraction mapping theorem need this subset to be complete for tunately lumina a chosel bubsit of a complete set is complete

gf suppose CCX C coosed X complete

let XXXCbe a Cauchy sequence

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	Theorem (Picard 184	o, lindelof 1894) Suppose for Xo & R"
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ball	PROOF 1 (almost wo	(ks) $(ks)$
	First Define V = Co	(J, B <sub>b</sub> (x <sub>0</sub> )) (continuous fors fist filx(t) - x <sub>0</sub>    ≤ b)  (C° complete in sup norm
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		- Annual Control of the Control of t
	T(x(t))-T(y(t)	1 $\leq$ $\int_{0}^{\infty}  f(x(z)) - f(y(z))  dz$ (use that $x, y \in B_{b}(x_{0})$ ) $\leq \int_{0}^{\infty}  f(x_{0})  dx$
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		for al finite and roll . I'm
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need to show T a contraction in the 11.11_1	
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=15 [f(x(s)) - f(y(s))] ds	
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