Sunday, September 13, 2020 3:02 PM

2.8: We will outline the proof to Thm 2.4.2

Note: The proof will be constructive. That is

We will create functions that approximate the solution to the IVP

We will use the **Method of Successive Approximation** (also called Picard's iteration method) to create functions $y = \phi_n(t)$ such that

$$\phi(t) = \lim_{n \to \infty} \phi_n(t)$$

a solution to IVP: $y' = f(t, y)$, $y(0) = 0$.

IVP: $y' = f(t, y)$, $y(t_0) = y_0$.

Can translate IVP to move initial value to the origin and translate back after solving:

Thm 2.8.1 is translated to origin version of Thm 2.4.2:

Thm 2.8.1: Suppose the functions

$$z = f(t, y) \text{ and } z = \frac{\partial f}{\partial y}(t, y)$$

are continuous for all t in $(-a, a) \times (-c, c)$,

then there exists an interval $(-h, h) \subset (-a, a)$ such that there exists a unique function $y = \phi(t)$ defined on $(-h, h)$ that satisfies the following initial value problem:

$$y' = f(t, y), \quad y(0) = 0.$$