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A NOTE ON THE FUNDAMENTAL THEORY OF ORDINARY DIFFERENTIAL EQUATIONS

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In this note we present some results on various problems connected with ordinary differential equations which do not necessarily satisfy a uniqueness condition. Using the concept of an integral funnel we are able to generalize the classical theorem on continuity with respect to initial conditions. This then leads to a reformulation of the problem of classifying the solutions of a given differential equation. That is, it is shown that every continuous vector field $f(x)$ on W gives rise to a bicontinuous injection of W into a space of functions $\boldsymbol{H}$, and consequently the problem of classifying solutions is equivalent to the problem of characterizing this family of bicontinuous injections. A detailed discussion, with proofs, will appear later.

1. **Introduction.** Let us consider the differential equation

$$x' = f(x) \tag{1}$$

where f is defined and continuous on some open, connected set W in R^n, real n-space. We shall let $W^* = W \cup \{\omega\}$ denote the one-point compactification of W. There is then at least one solution $\phi(p, t)$ of (1) through every point $p \in W$ with $\phi(p, 0) = p$. Moreover, every solution is defined on some maximal interval J_p where either $J_p = R^1$ or $\phi(p, t) \to \{\omega\}$ as $t \to bdy\ J_p$. It should be noted that since the solutions of (1) may not be unique, the interval J_p depends not only on p

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