ODE Lecture

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Contents

1. **Lecture 2 (1.1)**:
    - **Definitions and Notations**:
    - **Verifying solutions / calc 1 review**:
    - **Solution of a DE**: The solution to a DE is continuous since it is differentiable
    - **Interval of definition**:
    - **Families of solutions**: nth order DE has an n-parameter family of solutions.
    - **Implicit solutions**:
    - **Implicit differentiation**
    - **Chain rule, product rule, quotient rule**
2. **Lecture 3 (1.2)**:
    - **Review of calc 2**
    - **Integration power rule**
    - **U-sub**
    - **By parts**
    - **Exponential functions**
    - **Trig functions**
    - **Rational functions**
    - **Initial value problems yield a unique (particular) solution**
    - **Interval of definition for a particular solution**: must be one interval containing the initial value, not a union.
3. **Lecture 4 (1.1)**:
    - **Mathematical models with differential equations**
    - **Rate of change, proportionality, group interactions**
    - **Newton's law of cooling**
4. **Lecture 5 (1.3)**:
    - **Slope (direction) fields and solution curves**
    - **Slope, critical points, increasing / decreasing slope**
5. **Lecture 6 (1.3)**
    - **Existence / uniqueness theorem**