Notes for Week 3 Discussion 3D
Winter 2025

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Strategy for Solving Bernouli Differential Equations.

The general form of a Bernoulli differential equation is:

$$\frac{dy}{dx} + P(x)y = Q(x)y^n,$$

where $n \neq 0, 1$.

Steps to Solve:

1. Decide if the equation is linear. Identify $P(x)$ and $Q(x)$.
2. Divide through by y^n:

$$y^{-n}\frac{dy}{dx} + P(x)y^{1-n} = Q(x).$$

3. Let $v = y^{1-n}$. Substituting into the original equation, we get:

$$\frac{1}{1-n}\frac{dv}{dx} + P(x)v = Q(x).$$

   Multiply through by $1 - n$ to simplify:

$$\frac{dv}{dx} + (1-n)P(x)v = (1-n)Q(x).$$

4. This is now a linear differential equation in v. Solve using the integrating factor method for linear differential equation.