Math 202 - 052
First Order Differential Equations
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Rewrite the DE

\[ M(x, y)dx + N(x, y)dy = 0 \]

- Use \( y = ux \) if N simpler
- Use \( x = vy \) if M simpler

M & N are Homog, of same degree
- check \( M_y = N_x \)
- exact or \( f(x, y) = \int Mdx + g(y) \)
  \( f(x, y) = \int Ndy + g(x) \)
- check \( (M_y - N_x)/N \) \( (N_x - M_y)/M \)

Force to exact
- substitution
- try something

\[ y' = f(x, y) \]

Ricatti
\[ y = y_1 + \frac{1}{u} \]
- given a particular solution \( y_1 \)
- do you have Bernolli eq.
  \[ y' + p(x)y = f(x) \]
- is it linear in \( y \)
- \( K(x) = e^{\int p(x)dx} \)
- do you have Bernolli eq.
  \[ u = y^{1-n} \]
- is it linear in \( x \)
- \( K(y) = e^{\int p(y)dy} \)
- do you have Bernolli eq.
  \[ u = x^{1-n} \]
- separable
  \[ y' = h(x)g(y) \]
- use \( u = Ax + By + C \)