Flow Chart for Solving a First-Order Differential Equation

$$\frac{dy}{dx} = f(x, y)$$

Exact?
$$Mdx + Ndy = 0$$
$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$$

Y

N

$$f(x, y) = c$$

Linear?
$$\frac{dy}{dx} + P(x)y = f(x)$$

Y

N

Make exact using I.F.
$$\mu(x) = e^{\int P(x)\,dx}$$

Separable?
$$\frac{dy}{dx} = \frac{g(x)}{h(y)}$$

Y

N

Integrate

Homogeneous?
$$\frac{dy}{dx} = F\left(\frac{y}{x}\right)$$

Y

N

Make separable using
$$u(x) = \frac{y}{x}$$

?