

Chain Rule and Implicit Differentiation

Joey Bernard

University of New Brunswick

May 12, 2024

Chain Rule

- Recall the chain rule from previous calculus classes
- $\frac{du(f)}{dx} = \frac{du}{df} * \frac{df}{dx}$
- This becomes a bit messier when we move to partial derivatives
- $\frac{\partial u(f,g)}{\partial x} = \frac{\partial u}{\partial f} * \frac{\partial f}{\partial x} + \frac{\partial u}{\partial g} * \frac{\partial g}{\partial x}$

Implicit Differentiation

- Sometimes, we can't rearrange $F(x, y)$ into some form of $y(x) = \dots$
- In these cases, we sometimes still need the derivative of $y(x)$
- We can use implicit differentiation
 - ▶ $\frac{dy}{dx} = \frac{-F_x}{F_y}$