

Quiz 5 solution

① Let $f(x) = \sin(5x)$
Find $f'(x)$.

~~Here~~ we use the chain rule:

$$\text{If } f(x) = g(h(x)) \text{ where } g(u) = \sin u \\ \text{and } h(x) = 5x$$

$$\text{Then } f'(x) = g'(h(x)) \cdot h'(x) = (\cos(5x)) \cdot 5 \\ = 5 \cos 5x$$

② Use implicit differentiation to find $\frac{dy}{dx}$ when

$$\sin(x+y) = x-y$$

$$\cos(x+y) \cdot \left(1 + \frac{dy}{dx}\right) = 1 - \frac{dy}{dx}$$

$$\cos(x+y) + \frac{dy}{dx} \cos(x+y) = 1 - \frac{dy}{dx}$$

$$\frac{dy}{dx} + \frac{dy}{dx} \cos(x+y) = 1 - \cos(x+y)$$

$$\frac{dy}{dx} (1 + \cos(x+y)) = 1 - \cos(x+y)$$

$$\frac{dy}{dx} = \frac{1 - \cos(x+y)}{1 + \cos(x+y)}$$