

Let $y = \sin x$.

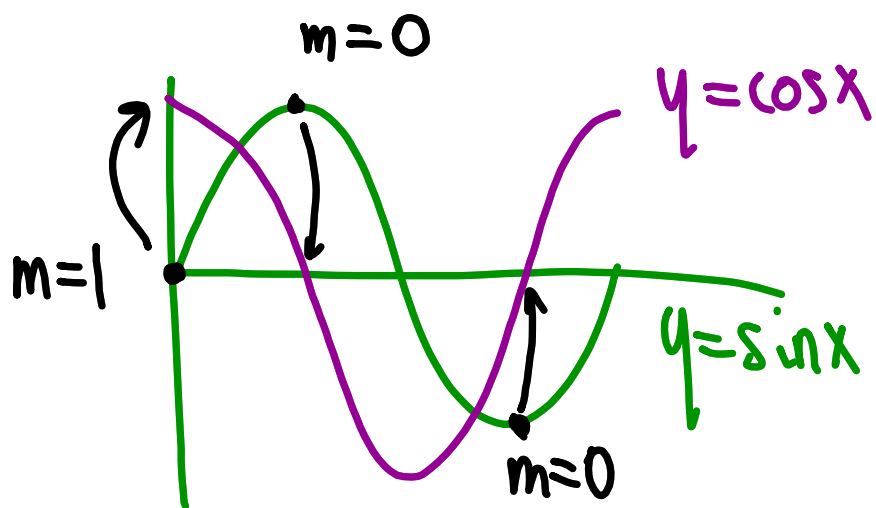
Find $\frac{dy}{dx}$.

$$\lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h}$$

$$\lim_{h \rightarrow 0} \frac{\sin x \cosh + \cos x \sinh - \sin x}{h}$$

$$\lim_{h \rightarrow 0} \frac{\sin x (\cosh - 1)}{h} + \frac{\cos x \sinh}{h} = \cos x$$

$$(\sin x)' = \cos x$$



$$y = \cos x$$

$$\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{\cos(x+h) - \cos x}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\underline{\cos x} \cosh - \sin x \sinh - \underline{\cos x}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cos x (\cosh - 1)}{h} - \frac{\sin x \sinh}{h} = -\sin x$$

$$\frac{d(\cos x)}{dx} = -\sin x$$

Find $f'(x)$

$$\begin{aligned} 1) f(x) &= \sin 2x \\ &= \sin(2x) \end{aligned}$$

$$\begin{aligned} f'(x) &= \cos(2x) \cdot 2 \\ &= 2 \cos(2x) \end{aligned}$$

$$\begin{aligned} 2) f(x) &= \sin^2 x \\ &= (\sin x)^2 \end{aligned}$$

$$\begin{aligned} f'(x) &= 2(\sin x) \cos x \\ &= \sin(2x) \end{aligned}$$

$$\cos(2x) = 1 - 2\sin^2 x$$

$$\cos(2x) - 1 = -2\sin^2 x$$

$$\frac{\cos(2x) - 1}{-2} = \sin^2 x$$

$$\frac{d}{dx} \left(\frac{\cos(2x) - 1}{-2} \right)$$

$$= \frac{1}{2} (+\sin(2x) \cdot 2) = \sin(2x)$$