TRIGONOMETRIC FUNCTIONS $\frac{D}{DX}\sin X$:

$$\frac{d}{dx}\sin x = \cos x$$

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

Product, quotient and chain rule also apply to trigonometric functions.

Product Rule: $\frac{d}{dx}[f(x)g(x)] = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

Chain Rule: $\frac{d}{dx}[f(g(x))] = f'(g(x))g'(x)$

Common question types:

1. $\frac{d}{dx}A\sin x = A\cos x$
2. $\frac{d}{dx}A\sin Bx = AB\cos Bx$
3. $\frac{d}{dx}A\sin(Bx + C) = AB\cos(Bx + C)$
4. $\frac{d}{dx}A\sin^c x = \frac{d}{dx}A(\sin x)^c = AC(\sin x)^{c-1}\cos x$
5. $\frac{d}{dx}\csc x = \frac{d}{dx}(\sin x)^{-1} = -(\sin x)^{-2}\cos x = -\cot x \csc x$

2.1 WORKED EXAMPLE

Differentiate $4\sin x$ with respect to x:

2.2 WORKED EXAMPLE

Show the following is true (hint: use chain rule):

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