

4.3 Les règles de dérivation des fonctions sinusoidales

Exemple

Détermine la dérivée de chaque fonction par rapport à x . Utilise la dérivation en chaîne.

a) $y = \cos(3x)$

Soit $u = 3x$

$u' = 3$

$y = \cos u$

$y' = -\sin u$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$\frac{dy}{dx} = \frac{d(\cos u)}{du} \cdot \frac{d(3x)}{dx}$$

$$= -\sin u \cdot 3$$

$$= -3\sin(3x)$$

b) $y = 2\sin(\pi x)$

Soit $u = \pi x$

$u' = \pi$

$y = 2\sin u$

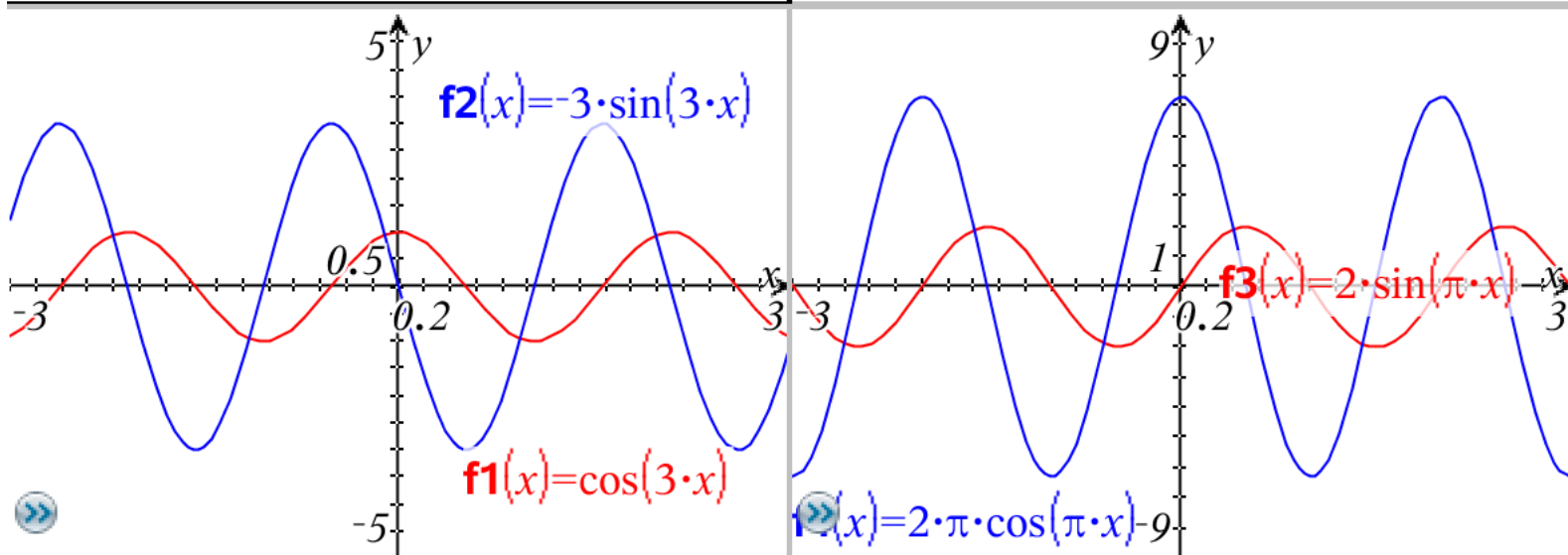
$y' = 2\cos u$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$\frac{dy}{dx} = \frac{d(2\sin u)}{du} \cdot \frac{d(\pi x)}{dx}$$

$$= 2\cos u \cdot \pi$$

$$= 2\pi\cos(\pi x)$$



c) $y = \cos^3 x$

Soit $u = \cos x$

$u' = -\sin x$

$y = u^3$

$y' = 3u^2$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$\frac{dy}{dx} = \frac{d(u^3)}{du} \cdot \frac{d(\cos x)}{dx}$$

$$= 3u^2(-\sin x)$$

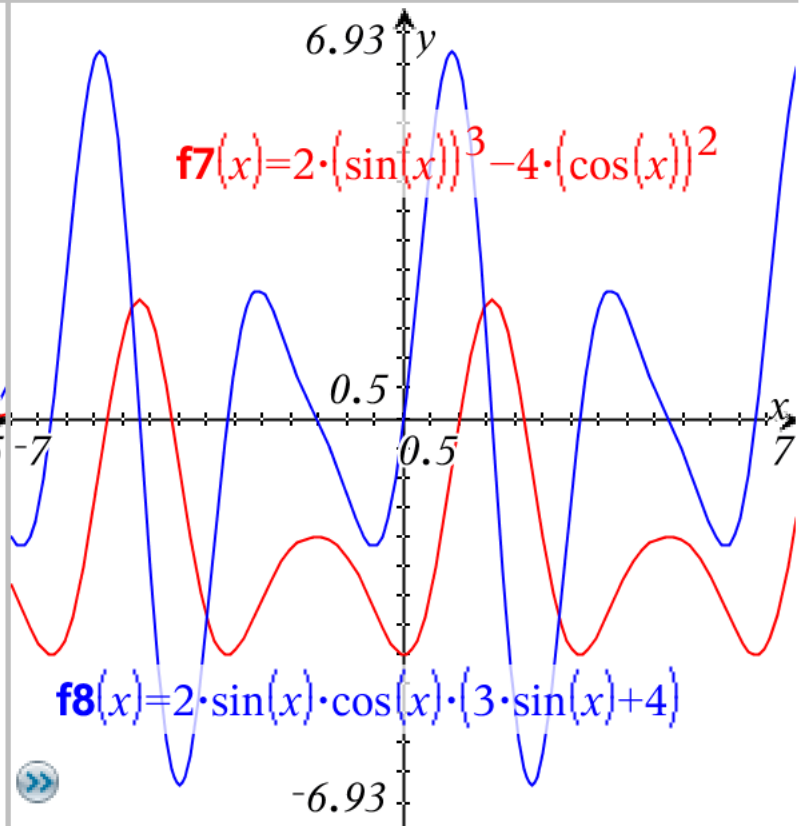
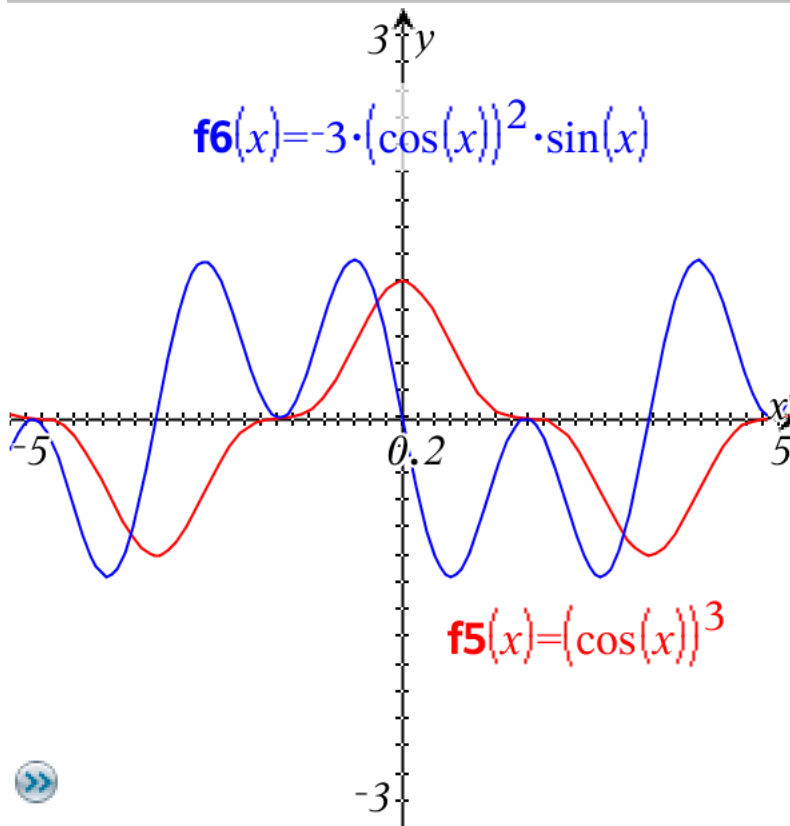
$$= -3\cos^2 x \sin x$$

d) $y = 2\sin^3 x - 4\cos^2 x$

$$y' = 6\sin^2 x(\cos x) - 8\cos x(-\sin x)$$

$$= 6\sin^2 x \cos x + 8\sin x \cos x$$

$$= 2\sin x \cos x (3\sin x + 4)$$



e) $y = t^3 \cos t$

$$y' = 3t^2 \cos t + t^3(-\sin t)$$

$$= t^2(3 \cos t - t \sin t)$$

f) $y = \sin(4t) \cos^2 t$

$$y' = 4 \cos(4t) \cos^2 t + \sin(4t)(2 \cos t(-\sin t))$$

$$= 2 \cos t(2 \cos(4t) \cos t - \sin(4t) \sin t)$$

