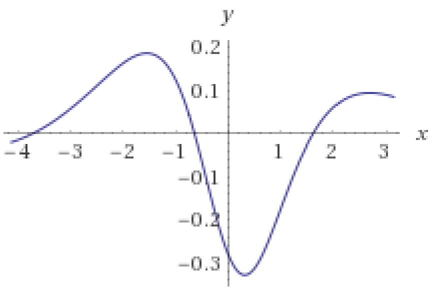
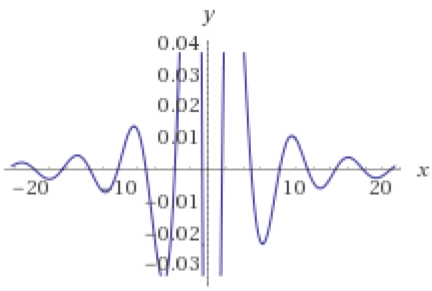
Derivative

$$\frac{d}{dx}\left(\frac{\cos(x+1)}{x^2+3}\right) = -\frac{(x^2+3)\sin(x+1)+2x\cos(x+1)}{(x^2+3)^2}$$

Plots



(x from −4.1 to 3.1)



(x from −22.3 to 21.4)

Alternate forms

$$\frac{x^2(-\sin(x+1))-3\sin(x+1)-2x\cos(x+1)}{(x^2+3)^2}$$

$$-\frac{x^2\sin(x+1)+3\sin(x+1)+2x\cos(x+1)}{(x^2+3)^2}$$

$$-\frac{\frac{1}{2}i\left(e^{-ix-i}-e^{ix+i}\right)(x^2+3)+\left(e^{-ix-i}+e^{ix+i}\right)x}{(x^2+3)^2}$$

Expanded form

$$-\frac{x^2\sin(x+1)}{(x^2+3)^2}-\frac{3\sin(x+1)}{(x^2+3)^2}-\frac{2x\cos(x+1)}{(x^2+3)^2}$$

Series expansion at x=0

$$-\frac{\sin(1)}{3}-\frac{5}{9}x\cos(1)+\frac{1}{2}x^2\sin(1)+\frac{23}{54}x^3\cos(1)-\frac{7}{24}x^4\sin(1)+O(x^5)$$

(Taylor series)

Series expansion at x=∞

$$\sin(x+1)\left(-\left(\frac{1}{x}\right)^2+\frac{3}{x^4}+O\left(\left(\frac{1}{x}\right)^6\right)\right)+\cos(x+1)\left(-\frac{2}{x^3}+\frac{12}{x^5}+O\left(\left(\frac{1}{x}\right)^7\right)\right)$$

Indefinite integral

$$\int -\frac{2x\cos(1+x)+(3+x^2)\sin(1+x)}{(3+x^2)^2}\,dx = \frac{\cos(x+1)}{x^2+3} + \text{constant}$$