3.6a Chain Rule

Use chain.tns to discover the amazing chain rule for derivatives of composite functions.

$$f'(x)\, g'(f(x))$$

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

$y=\sin(x^2+x)$ $\quad (2x+1)\cdot\cos(x^2+x)$

$y=\sin^5 x = (\sin x)^5$

$5(\sin x)^4(\cos x)$

$y=(x^3+2x-1)^4$

$4(x^3+2x-1)^3(3x^2+2)$

$y=\underbrace{(x^3-x)^5}_{1}\underbrace{\sin(4x)}_{2}$

$\underbrace{((x^3-x)^5}_{1}\underbrace{(\cos(4x)4)}_{d2}+\underbrace{(\sin(4x)}_{2}\underbrace{(5(x^3-x)^4(3x^2-1))}_{d2}$

$y=\dfrac{\overset{1}{x^2}\,\overset{2}{\sin x}}{\sec(3x^2)}$

$$\frac{\sec(3x^2)(x^2\cos x+(\sin x)(2x))-(x^2\sin x)(\sec(3x^2)\tan(3x^2)6x)}{(\sec(3x^2))^2}$$

If a particle moves along the x-axis so that its position is given by $x(t) = \cos\left(t^2 + 1\right)$, find the velocity.