

3.6 Chain Rule

Example 1 Inside and outside functions

Identify the inside and the outside function in each composition

Inside

Outside

a) $y = \sin^2 x$

b) $y = \cos(x^2 + 9)$

c) $y = (x^2 + 10)^{15}$

d) $y = \sin(\tan x)$

e) $y = \sin x \tan x$

Chain Rule:

$$\frac{d}{dx}f(u(x)) =$$

Example 2

Determine the derivative of each function:

a) $y = \sin^3 x$

b) $y = \frac{1}{(x^2+1)^3}$

c) $y = \left(\frac{\cos x}{1+\sin x}\right)^2$

d) $y = ((x^3 + 2x)^2 + 10)^{15}$

Try:

e) $y = \cos(5x)$

f.) $y = \sin x^2$

g) $y = \cos(x^2 + 3)$

h) $y = \tan(\sin(x^2))$

i) $y = x^2 \sin(x^2 + 3)$

$$\text{j) } y = \frac{\sin x}{\sec 2x}$$

$$\text{k) } y = \frac{x^2+6}{\sin^4 x}$$

$$\text{l) } y = x^3(3x - 1)^4$$

$$\text{m) } y = \sin^3(2x - 1)$$

$$\text{n) } y = (1 + \sin 3x)^4$$