

# Calculus BC

## Section 2.4 - The Chain Rule

**Obj:** - To find the derivative of a function using the Chain Rule

### The Chain Rule:

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

Derivative of the  
outer function

Derivative of the  
inner function

1.  $y = (3x + 1)^2$

-Expand the function then differentiate:

$$y =$$

$$y' =$$

- Differentiate using the Chain Rule:

outer function  $f(x) =$

$$f'(x) =$$

inner function  $g(x) =$

$$g'(x) =$$

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

$$2. \quad y = (3x^2 + 9)^5$$

outer function  $f(x) =$

$f'(x) =$

inner function  $g(x) =$

$g'(x) =$

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

$$3. \quad y = \frac{4}{(2x-1)^3}$$

-rewrite function  
to remove denominator

$$y =$$

$$y' =$$

$$4. \quad y = \frac{x}{\sqrt[3]{x^2 + 4}}$$

-rewrite function

$$y =$$

$$y' =$$

5.  $y = \sin(3x)$   
 $y' =$

6.  $y = (\sin 3x)^7$   
 $y' =$

7.  $y = \tan^4(5x)$   
 $y' =$

8.  $y = (3x + 2)^7 (2x + 1)^6$   
 $y' =$

-product and chain rules

9.  $y = \sin(\cos 2x)$

