Example 3 :

Solve for x in $\log_3 x = 2$

Solution:

$\log_3 x = 2$
$3^2 = x$
$\Rightarrow x = 9$

Example 4 :

If $2 \log x = 4 \log 3$, then find the value of 'x'.

Solution :

$2 \log x = 4 \log 3$

Divide each side by 2.

$\log x = (4 \log 3) / 2$

$\log x = 2 \log 3$

$\log x = \log 3^2$

$\log x = \log 9$

$x = 9$

Example 5

Solve for x in the following logarithmic function $\log_2 (x - 1) = 5$.

Solution
Rewrite the logarithm in exponential form as;

$\log_2 (x - 1) = 5 \Rightarrow x - 1 = 2^5$

Now, solve for x in the algebraic equation.

$\Rightarrow x - 1 = 32$

$x = 33$

Example 9 :

Solve for x given, $\log x = \log 2 + \log 5$

Solution :

Using the product rule $\text{Log}_b (m\,n) = \log_b m + \log_b n$ we get;

$\Rightarrow \log 2 + \log 5 = \log (2 * 5) = \text{Log}(10).$

Therefore, $x = 10$.

Example 10

Solve $\log_x (4x - 3) = 2$

Solution :

Rewrite the logarithm in exponential form to get;

$x^2 = 4x - 3$

Now, solve the quadratic equation.

$x^2 = 4x - 3$

$x^2 - 4x + 3 = 0$

$(x - 1)(x - 3) = 0$

$x = 1 \text{ or } 3$

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CHAPTER FOURTH

Derivatives :

Below is a list of all the derivative rules we went over in class.

1- Constant Rule: f(x) = c then f 0 (x) = 0

<u>Example :</u>

Given $(x) = -5$

$f'(x) = 0$

2- Power Rule: $f(x) = x^n$ then $f(x) = nx^{n-1}$

<u>Example :</u>

$d/dx(x^5) = 5x^{5-1} = 5x^4$

1- $f'(x)=u'(x)\pm v'(x)$

Example :

$f'(x) = d/dx(x + x^3)$

$f'(x) = d/dx(x) + d/dx(x^3)$

$f'(x) = 1 + 3x^2$

4- $f'(x) = u'(x) \times v(x) + u(x) \times v'(x)$

<u>Example :</u>

$u(x) = x^2$ and $v(x) = x+3$

Therefore, on differentiating the given function, we get;

$f'(x) = d/dx[x^2(x+3)]$

$f'(x) = d/dx(x^2)(x+3)+x^2 d/dx(x+3)$

$f'(x) = 2x(x+3)+x^2(1)$

$f'(x) = 2x^2+6x+x^2$

$f'(x) = 3x^2+6x$

$f'(x) = 3x(x+2)$

<u>Example:</u>

Differentiate: $f(x)=(x+2)^3/\sqrt{x}$

<u>Solution:</u>

Given,

$f(x)=(x+2)^3/\sqrt{x}$

$= (x+2)(x^2+4x+4)/\sqrt{x}$

$= [x^3+6x^2+12x+8]/x^{1/2}$

$= x^{-1/2}(x^3+6x^2+12x+8)$

$= x^{5/2}+6x^{3/2}+12x^{1/2}+8x^{-½}$

Now, differentiating the given equation, we get;

$f'(x) = 5/2x^{3/2} + 6(3/2x^{1/2})+12(1/2x^{-1/2})+8(-1/2x^{-3/2})$

$= 5/2x^{3/2} + 9x^{1/2} + 6x^{-½} - 4x^{-3/2}$

5- Quotient Rule $f/g = f' g - g' f /g2$