Derivative of Exponential functions	
d ex z ex	
dr 22+1 0: 1 dy	
Example: y = e find dy	
	.4
Let u= 22+1 2	
=> 4 = e"	
	7.
dy - dy du	
dx du dn	
= d e d (x2+1)	
du dn	
$=e^{\chi^2+1}$ . $2\chi$ .	
1 1 1 1 1	
$d a^{x} = a^{x}(\ln a).$	
dy on all	
Example: $y = a^{n}$ , find dy.	
- dn	
Leb u=NX	
=> y = a"	
dy dy du	
dr du dr	
- d a d d d d d d d d d d d d d d d d d	· · · · · ·
$=$ $\alpha$ $ln\alpha$ .	- 100 A - 100
21/1	

= ax, find dy Ina yena nenou Milnou

Derivative of the logarithmic function:
$\frac{d}{dx}\left(\ln x\right) = \frac{1}{x}$ $\frac{d}{dx}\left(\ln x\right) = \frac{1}{x}$ $\frac{d}{dx}\left(\ln x\right) = \frac{1}{x}$ $\frac{d}{dx}\left(\ln x\right) = \frac{1}{x}$
Example: Differentiale In (x2+2x) w.x.t. x.
Lets y= ln (n2+2n)
$\frac{dy}{dy} = \frac{1}{(y^2 + 2y)} \frac{d}{dy} (y^2 + 2y)$
$= \frac{2N+2}{(N^2+2N)},$
Example: y=log(am2+bn+c)
Let u=(an2+bn+c)
=> y z log u
dy = dy du
dn du dn
= d (log u). d (m²+bn+c)
= 1 (2an+b). (an2+bn+c) In10

## EXERCISE 2.6

1. Find 
$$f'(x)$$
 if

(i) 
$$f(x) = e^{\sqrt{x-x}}$$

1. Find 
$$f'(x)$$
 if

(i)  $f(x) = e^{\sqrt{x}-1}$  (ii)  $f(x) = x^3 e^{\frac{1}{x}} (x \neq 0)$  (iii)  $f(x) = e^x (1 + \ln x)$ 

(iv)  $f(x) = e^{x}$  (v)  $\ln (e^x + e^{-x})$  (vi)  $f(x) = e^{x} - e^{-x}$ 

(iii) 
$$f(x) = e^x (I + \ln x)$$

(iv) 
$$f(x) = \frac{e^x}{e^{-x} + 1}$$

(v) 
$$\ln\left(e^x + e^{-x}\right)$$

(vi) 
$$fx = \frac{e^{\alpha x} - e^{-\alpha x}}{e^{\alpha x} + e^{-\alpha x}}$$

(vii) 
$$f(x) = \sqrt{\ln(e^{2x} + e^{-2x})}$$

(iv) 
$$f(x) = \frac{e^x}{e^{-x} + 1}$$
 (v)  $\ln(e^x + e^{-x})$  (vi)  $fx = \frac{e^{ax} - e^{-ax}}{e^{ax} + e^{-ax}}$  (vii)  $f(x) = \sqrt{\ln(e^{2x} + e^{-2x})}$  (viii)  $f(x) = \ln(\sqrt{e^{2x} + e^{-2x}})$ 

## 2. Find $\frac{dy}{dx}$ if

(i) 
$$y = x^2 \ln \sqrt{x}$$

(ii) 
$$y = x\sqrt{\ln x}$$

(ii) 
$$y = x\sqrt{\ln x}$$
 (iii)  $y = \frac{x}{\ln x}$ 

(iv) 
$$y = x^2 \ln \frac{1}{x}$$

(v) 
$$y = ln \sqrt{\frac{x^2 - 1}{x^2 + 1}}$$

(iv) 
$$y = x^{2} \ln \frac{1}{x}$$
 (v)  $y = \ln \sqrt{\frac{x^{2} - 1}{x^{2} + 1}}$  (vi)  $y = \ln \left(x + \sqrt{x^{2} + 1}\right)$  (vii)  $y = \ln \left(9 - x^{2}\right)$  (viii)  $y = e^{-2x} \sin 2x$  (ix)  $y = e^{-x} \left(x^{3} + 2x^{2} + 1\right)$  (x)  $y = x e^{\sin x}$  (xi)  $y = 5e^{3x-4}$  (xii)  $y = (x+1)^{x}$ 

(Vii) 
$$y = ln(9-x^2)$$

(viii) 
$$y = e^{-2x} \sin 2x$$

(ix) 
$$y = e^{-x} (x^3 + 2x^2 + 1)$$

$$(x) y = x e^{\sin x}$$

(xi) 
$$y = 5e^{3x-x}$$

(xii) 
$$y = (x+1)^x$$

(xiii) 
$$y = (\ln x)^{\ln x}$$

(xiv) 
$$y = \frac{\sqrt{x^2 - 1}(x+1)}{(x^3 + 1)^{3/2}}$$

3. Find 
$$\frac{dy}{dx}$$
 if

(i) 
$$y = \cosh 2x$$

(ii) 
$$y = \sinh 3x$$

(iii) 
$$y = \tanh^{-1}\left(\sin x\right)$$
  $\frac{\pi}{2}$   $x$   $\frac{\pi}{2}$  (iv)  $y = \sinh^{-1}\left(x^3\right)$   
(v)  $y = \ln\left(\tanh x\right)$  (vi)  $y = \sinh^{-1}\left(\frac{x}{2}\right)$ 

(iv) 
$$y = \sinh^{-1}\left(x^3\right)$$

(v) 
$$y = ln(tanh x)$$

(vi) 
$$y = \sinh^{-1}\left(\frac{x}{2}\right)$$

version: 1.1