

	Liblem Cated
	b, xy = x-y
	(i) $\frac{d}{dx}(ny) = \frac{d}{dx}(x-y)$
	a y dy + y - 1 - dy
	dn
	= dy = 1-4
	dr x+1
	(ii) $xy = x - y$
	$(\exists) y (x \neq 1) = x$ $(\exists) y = \frac{x}{x \neq 1}$
	$ext{dy} = \frac{x+1-x}{dx} = \frac{1}{(x+1)^2}$
	$dn \left(x+1\right)^2 \left(x+1\right)^2$
	L. du
	(iii) $x \cdot \frac{dy}{dn} + y = 1 - \frac{dy}{dn}$
	$\frac{dy}{dy} = \frac{1-y}{1-y}$
	$\frac{\partial}{\partial x} = \frac{\partial}{\partial x} = \frac{\partial}{(x+1)^2}$
	We can see (ii) and (iii) each give dy = 1
	dr (x+1)2
	du de la companya de
2	a, 1 + 1 = 1.
	y
	(a) y-1 + x-1 = 1.
	( -y-2 dy 2 2-2 = 0.
	dr 1
	(a) ay = -1 = -9
	dn y-2 x2
	12 - 13 - 16 org day (16) ban (16) 200 run si

b) 
$$x^3 - y^3 = 6xy$$

(a)  $\frac{d}{dx}(x^3 - y^3) = \frac{d}{dx}(6xy)$ 

(b)  $\frac{d}{dx}(x^3 - y^3) = \frac{d}{dx}(6xy)$ 

(c)  $\frac{d}{dx}(x^3 - 6x) = 6y = 6y - 3x^2$ 

(d)  $\frac{d}{dx}(x^3 - 6x) = 6y$ 

(e)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(f)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(g)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(e)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(f)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(g)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(e)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(f)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

(g)  $\frac{d}{dx}(x^3 - 3x^3 - 6x)$ 

(g)  $\frac{d}{dx}(x^3 - 6x) = \frac{d}{dx}(y^3 - 6x)$ 

RHS =  $\frac{d}{dx} \left( \cot y(x) \right) \left( \csc (x) + 1 \right) - \cot \left( y(x) \right) \frac{d}{dx} \left( \csc \left( y(x) \right) + 1 \right)$ (csc (you) +1)2  $= \frac{\left(\csc\left(y(x)\right)+1\right)\left(-\csc^{2}\left(y(x)\right)\right)}{\frac{d}{dx}}\left(y(x)\right)-\cot\left(y(x)\right)\frac{d}{dx}\left(\csc\left(y(x)\right)+1\right)}{\left(\csc\left(y(x)\right)\right)+1\right)^{2}}$   $\left(-\cot\left(y(x)\right)\right)\left(-\cot\left(y(x)\right)\right)\left(-\cot\left(y(x)\right)\right)-\left(-\cot\left(y(x)\right)\right)\left(-\cot\left(y(x)\right)\right)\frac{d}{dx}\left(y(x)\right)\right)$  $\frac{dx}{\left(\csc\left(y(x)\right)+1\right)^{2}}$   $\left(-\csc\left(y(x)\right)+1\right)\csc^{2}\left(y(x)\right)\frac{d}{dx}\left(y(x)\right)+\cot^{2}\left(y(x)\right)\csc\left(y(x)\right)\frac{d}{dx}\left(y(x)\right)$ (csc(y(x))+1)2  $\frac{d}{dx}(y(x))$   $\sin(y(x)) + 1$   $\int \cot(y(x))$   $\csc(y(x) + 1)$  -dxde (y(x)) = sin (ycu) +1  $\Rightarrow 2n = \frac{dy}{dx}$   $\sin(y) + 1$  $\frac{dy}{dx} = -2x \left( \sin(y) + 1 \right)$ 

a, $3x^2 - 4y^2 = 7$ .	
$\frac{3}{3}$ $\frac{1}{3}$ $\frac{1}$	
$\frac{3}{dx}\left(3x^2-4y^2\right)=\frac{d}{dx}\left(x\right)$	
· · ·	1 = 1+ and - and
$\Rightarrow 6x - 8y \frac{dy}{dx} = 0.$ $\Rightarrow \frac{dy}{dx} = 3x$	the state of the
=) dy = 32	( charge ) to the
$\frac{1}{dx} = \frac{3x}{4y}$	
d [dy] d (3x)	(und pre - u co
$\frac{d}{dn}\left(\frac{dy}{dx}\right) = \frac{d}{dn}\left(\frac{3x}{4y}\right)$	The state of the s
$\frac{dn}{dx} \frac{dx}{dx} \frac{dx}{dx} \frac{4y}{3x^2 - 3x^2 - 3x^2 - 4}$	ty And And
dri dy 2	da .
$\frac{\partial x^2}{\partial x^2} = \frac{16y^2}{9x^2/y}$	
16y2	OS X ANX
$= 3(4y^2 - 3x^2)$	Para I To self a 1 o
16y3+	
h 900 - 112 - 3	
d law at d (2)	Sec. 18 c. ml
b) $2ny - y^2 = 3$ . $\frac{d}{dx}(2ny - y^2) = \frac{d}{dx}(3)$	The state of the s
The heady andy	h
$\frac{dy}{dx} + 2x \frac{dy}{dx} - 2y \frac{dy}{dx} =$	The Park of the Pa
$\frac{dy}{dn} = \frac{-y}{n-y} = \frac{y}{y-x}$ $\frac{d}{dy} = \frac{-y}{n-y} = \frac{y}{y-x}$	(45.71)
dn = 1-4 = y-2	What I was the
d (dy) - d (y)	The state of the s
dr dn dx (y-x)	The state of the s
(dy) ( ) ( dy	21)16 1 20 5 100
$\frac{d^2y}{dx} = \left(\frac{dy}{dx}\right)(y-x) - y \cdot \left(\frac{dy}{dx}\right)$	-1/14
$\frac{dx^2}{dx^2} = \frac{(y-x)^2}{(y-x)^2}$	AND AD
(u+x-4)	A THE WAY OF THE PERSON OF THE
y-y - y-x	X . 27 . 10 .
= ( 3 ~ )	45
- (y-n)2	(ral) - y of
y - 32	I and the same
y-x	g - Zivy
$(y-x)^2$	$(y-x)^3$
	STATE OF THE PARTY

10 a, 
$$y = \ln 2\pi$$

b,  $y = \sqrt[3]{\ln x + 1} = (\ln x + 1)^{1/3}$ 

b,  $y = \sqrt[3]{\ln x + 1} = (\ln x + 1)^{1/3}$ 

c,  $y = \log(\ln x)$ 

dy

 $\frac{1}{dx} = \frac{1}{3} (\ln x + 1)^{-2/3} = \frac{1}{x}$ 

c,  $y = \log(\ln x)$ 
 $\frac{1}{dx} = \frac{1}{x \ln x} = \frac{1}{x \ln x}$ 

d,  $y = \ln(x^{3/2} \sqrt{1 + x^4})$ 
 $\frac{1}{3} \ln x + \frac{1}{4} \ln(4 + x^4)$ 
 $\frac{1}{4} \ln x + \frac{1}{$ 

i)  $y = \ln (\sqrt[3]{x+1})$   $\frac{dy}{dx} = \frac{1/3(x+1)^2}{\sqrt[3]{x+1}}$ j)  $y = \frac{1 + \log x}{1 - \log x}$   $\frac{dy}{dx} = \frac{1}{x} (1 - \log x) - (1 + \log x) - (\frac{-1}{x})$   $\frac{1}{x} + \frac{1}{x} + \frac{1 - \ln x}{x}$   $\frac{1}{x} + \frac{1}{x} + \frac{1 - \ln x}{x}$  $=\frac{\ln x+1}{x(1-\ln x)^2}+\frac{1}{x(1-\ln x)^2}$  $\frac{2}{x(1-\ln x)^2} \frac{\chi(1-\ln x)(2+1)}{\chi(1-\ln x)^2}$   $\frac{2}{x(1-\ln x)^2}$   $\frac{2}{x(1-\ln x)^2}$   $\frac{2}{x(1-\ln x)^2}$   $\frac{2}{x(1-\ln x)^2}$   $\frac{2}{x(1-\ln x)}$  $\frac{1}{3} \frac{dy}{dx} = \frac{1}{2x} + \frac{\ln \cos x}{\cos x} - \ln \left( \frac{1 + n^2}{2x} \right)$   $\frac{dy}{dx} = \frac{1}{2x} + \frac{-\sin x}{\cos x} - \frac{2n}{1 + n^2} = \frac{1 - 3x^2}{2n + 2x^3} + \frac{1 - 3x^2}{2n + 2x^3}$  $l, y = ln \left( \frac{1 + e^x + e^{2x}}{1 - e^{3x}} \right)$ =  $\ln (1 + e^{x} + e^{2x}) - \ln (1 - e^{3x})$  $\frac{dy}{dn} = \frac{e^{x} + 2e^{2x}}{1 + e^{x} + e^{2x}} = \frac{-3e^{3x}}{1 - e^{3x}}$   $= \frac{-(e^{x} + 2e^{2x})(1 - e^{x}) + 3e^{3x}}{1 - e^{3x}}$   $= \frac{e^{x} + e^{2x} + e^{3x}}{1 - e^{x}} = \frac{e^{x}}{1 - e^{x}}$ 

10. 
$$y = (1+x)^{1/x}$$
 $\frac{dy}{dx} = (1+x)^{1/x} \cdot \frac{d}{dx} \left( \ln(x+1) \cdot \frac{1}{x} \right)$ 
 $= (1+x)^{1/x} \cdot \frac{d}{dx} \left( \ln(x+1) \cdot \frac{1}{x} \right)$ 
 $= (x+1)^{1/x} \cdot \left( \frac{x}{x+1} - \ln(x+1) \right)$ 
 $= (x+1)^{1/x} \cdot \left( \frac{1}{x} - \ln(x+1) \right)$ 
 $= (x+1)^{1/x} \cdot \left( \frac{1}{x} - \ln(x+1) \right)$ 
 $= (x+1)^{1/x} \cdot \left( \frac{1}{x} - \ln(x+1) \right)$ 
 $= \ln(x+1) + 2\ln(x+2)^{\frac{1}{x}} \cdot \frac{1}{x^{2}} \cdot \frac{1}{x^{2}}$ 
 $= \ln(x+1) + 2\ln(x+2) - 3\ln(x+3) - 4\ln(x+4)$ 
 $\Rightarrow \frac{dy}{dx} = \frac{1}{x+1} + \frac{2}{x+2} \cdot \frac{3}{x+3} \cdot \frac{4}{x+4}$ 
 $\Rightarrow \frac{dy}{dx} = \frac{1}{x+1} + \frac{2}{x+2} \cdot \frac{3}{x+4} \cdot \frac{4}{x+4}$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \ln(\sinh x) - \ln(\sec x)$ 
 $\Rightarrow \frac{dy}{dx} = \frac{1}{x} + \frac{1}{x} - \cot x - \tan x$ 
 $\Rightarrow \frac{dy}{dx} = \frac{1}{x^{2}} + \frac{1}{x} - \cot x - \tan x$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
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 $\Rightarrow \frac{1}{x} \ln x + \frac{1}{x} \ln(x+1) - \frac{1}{x} \ln(x+1)$ 
 $\Rightarrow \frac{$ 

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b, y = \sqrt[3]{\frac{\chi^2 - 1}{\chi^2 + 1}}
                      \log y = \frac{1}{3} \log \frac{x^2 - 1}{x^2 + 1}
= \frac{1}{3} \log (x^2 - 1) - \frac{1}{3} \log (x^2 + 1)
                   \frac{1}{y} \frac{dy}{dx} = \frac{2x}{3(x^2-1)} \frac{2x}{3(x^2+1)} = \frac{x^3+x-2x^3+2x}{3(x^4-1)}
                \frac{dy}{dx} = \frac{4xy}{3(x^4-1)}
 12 +) Let f(x) = e^{3x} \rightarrow y'(x) = 3e^{3x}

+) The tangent line to e^{3x} at x = a \rightarrow k = 3e^{3a}

\Rightarrow y - e^{3a} = 3e^{3a}(x-a) = 3e^{3a}x - 3ae^{3a}

\Rightarrow y = 3e^{3a}x - 3ae^{2a} + e^{3a}

= e^{3a}(3x - 3a + 4).

+) Pass through the origin \Rightarrow e^{3a}(1-3a) = 0.

\Rightarrow 1-3a = 0 (e^{3a} \neq 0).
             f\left(\frac{1}{3}\right) = e.

4) The point whose tangent line passes through (0;0) is A\left(\frac{1}{3};e\right).
13. y = e^{\alpha x} \sinh x
          y = e^{ax} \sinh x

+) y' = ae^{ax} \sinh x + e^{ax} \cdot b \cos bx.

+) y'' = a' \cdot e^{ax} \sinh x + ae^{ax} \cdot b \cos bx + ae^{ax} b \cos bx - e^{ax} b^2 \sinh x.

= (a^2 - b^2) e^{ax} \sinh x + 2ab e^{ax} \cdot \cos bx.
 +) y'' - 2ay' + (a^2 + b^2)y
-(a^2 - b^2) e^{ax} \sinh x + 2abe^{ax} \cosh - 2a (ae^{ax} \sinh x + b^2)e^{ax} \sinh x = 0 \quad (\text{tiper}).
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14 a, $\lim_{R \to 0} \frac{(1+R)^{T}-1}{R}$ = $\lim_{R \to 0} \frac{\pi}{(R+1)^{T-1}}$ = $\lim_{R \to 0} \frac{\pi}{(R+1)^{T-1}}$ b, $\lim_{X \to e} \frac{1-\ln x}{(x-e) \ln x}$ = $\lim_{X \to e} \left(\frac{1-\ln x}{x-e} - \frac{1}{\ln x}\right)$ = $\lim_{X \to e} \left(\frac{1-\ln x}{x-e} - \frac{1}{\ln x}\right)$ = $\lim_{X \to e} \left(\frac{e^x - x^2}{x^2 - 1} - \frac{1}{e^x}\right) = \infty$ b, $\lim_{X \to 1} \frac{\ln x}{x^2 - 1}$ = $\lim_{X \to 1} \frac{\ln x}{x^2 - 1} - \frac{1}{x^2 - 1}$ b, $\lim_{X \to 1} \frac{\ln x}{x^2 - 1} - \frac{1}{x^2 - 1}$ = $\lim_{X \to 1} \frac{x^2 - 1}{x^2 - 1} - \frac{1}{x^2 - 1}$			
$ \frac{\lim_{n \to 0} \mathbb{T}(n+1)^{n-1}}{\ x ^{n}} = \frac{1}{\ x ^{n}} $ $ \frac{\lim_{n \to 0} \mathbb{T}(n+1)^{n-1}}{\ x ^{n}} = \frac{1}{\ x ^{n}} $ $ \frac{\lim_{n \to 0} (1 - \ln x)}{\ x ^{n}} = \frac{1}{\ x ^{n}} $ $ = \lim_{n \to 0} (1 - \ln x) + \lim_{n \to 0} (1 + \ln x) $ $ = \lim_{n \to 0} (e^{x} - x^{2}) + \lim_{n \to \infty} (e^{x} - x^{2}) $ $ = \lim_{n \to \infty} (e^{x} + x^{2}) = \infty $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{\lim_{n \to \infty} \ln x^{n}}{x^{n}} = \frac{1}{x^{n}} $ $ \frac{1}{x^{n}} = \frac{1}{x^{n}} $ $\frac{1}{x^{n}} = \frac{1}{x^{n}} $ $1$	1/6	0- (1+R)*-1	
$ \frac{\pi(0+1)^{1/4}}{1} = \pi $ b, $\lim_{x \to e} \frac{1 - \ln x}{(x-e) \ln x}$ $= \lim_{x \to e} \left(\frac{1 - \ln x}{x-e} - \frac{1}{\ln x}\right)$ $= \lim_{x \to e} \left(\frac{1 - \ln x}{x-e} - \frac{1}{\ln x}\right)$ $= \lim_{x \to e} \left(e^x - x^2\right)$ $= \lim_{x \to +\infty} \left(e^x \left(1 - \frac{x^2}{e^x}\right)\right) = \infty$ b) $\lim_{x \to +\infty} \left(e^x \left(1 - \frac{x^2}{e^x}\right)\right) = \infty$ $= \lim_{x \to +\infty} \left(\ln \frac{1}{x^2} - \frac{1}{x^2-1}\right)$ $= \lim_{x \to +\infty} \ln x - \lim_{x \to +\infty} \frac{1}{x^2-1}$ c) $\lim_{x \to 0} \frac{x^2 - e^x}{\sin^2 3x}$ $= \lim_{x \to 0} \frac{2x e^x + e^x - x^2}{3\sin 6x} = \lim_{x \to 0} \frac{e^x x^2 + 4e^x - x}{3\sin 6x} + 2e^x = 1$	14	470 h	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		Dim T (A+1) T-1	- + 1
$ \frac{\pi(0+1)^{1/4}}{1} = \pi $ b, $\lim_{x \to e} \frac{1 - \ln x}{(x-e) \ln x}$ $= \lim_{x \to e} \left(\frac{1 - \ln x}{x-e} - \frac{1}{\ln x}\right)$ $= \lim_{x \to e} \left(\frac{1 - \ln x}{x-e} - \frac{1}{\ln x}\right)$ $= \lim_{x \to e} \left(e^x - x^2\right)$ $= \lim_{x \to +\infty} \left(e^x \left(1 - \frac{x^2}{e^x}\right)\right) = \infty$ b) $\lim_{x \to +\infty} \left(e^x \left(1 - \frac{x^2}{e^x}\right)\right) = \infty$ $= \lim_{x \to +\infty} \left(\ln \frac{1}{x^2} - \frac{1}{x^2-1}\right)$ $= \lim_{x \to +\infty} \ln x - \lim_{x \to +\infty} \frac{1}{x^2-1}$ c) $\lim_{x \to 0} \frac{x^2 - e^x}{\sin^2 3x}$ $= \lim_{x \to 0} \frac{2x e^x + e^x - x^2}{3\sin 6x} = \lim_{x \to 0} \frac{e^x x^2 + 4e^x - x}{3\sin 6x} + 2e^x = 1$		R-70 1	
b, $\lim_{x \to e} \frac{1 - \ln x}{(x - e) \ln x}$ = $\lim_{x \to e} \left( \frac{1 - \ln x}{x - e} \right) \cdot \lim_{x \to e} \left( \frac{1}{\ln x} \right)$ = $\lim_{x \to e} \left( \frac{1 - \ln x}{x - e} \right) \cdot \lim_{x \to e} \left( \frac{1}{\ln x} \right)$ = $\lim_{x \to +\infty} \left( e^x \left( 1 - \frac{x^2}{e^x} \right) \right) = \infty$ b, $\lim_{x \to +\infty} \left( \ln x \right) \cdot \lim_{x \to +\infty} \left( \frac{1}{x^2 - 1} \right) = \infty$ b, $\lim_{x \to +\infty} \left( \ln x \right) \cdot \lim_{x \to +\infty} \left( \frac{1}{x^2 - 1} \right) = \infty$ c, $\lim_{x \to 0} \frac{1}{x^2 - 1} \cdot \lim_{x \to 1} \frac{1}{x^2 - 1}$		T(0+1) T-1	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		1	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		b, lim 1-lnx	A L
$= \lim_{n \to e} \left( \frac{1 - \ln x}{x - e} \right) \cdot \lim_{x \to e} \left( \frac{1}{\ln x} \right)$ $= \lim_{n \to e} \left( \frac{1 - \ln x}{x - e} \right) \cdot \lim_{x \to +\infty} \left( \frac{1 - \ln x}{x - e} \right)$ $= \lim_{x \to +\infty} \left( e^{x} \left( 1 - \frac{x^{2}}{e^{x}} \right) \right) = \infty  \text{and}  \text$		re (r-e) lor	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		- lim (1-lnx 1)	The state of the s
15 a, $\lim_{x \to +\infty} (e^{x} - x^{2})$ $= \lim_{x \to +\infty} (e^{x} (1 - \frac{x^{2}}{e^{x}})) = \infty$ b, $\lim_{x \to 1} \frac{\ln x}{x^{4} - 1}$ $= \sqrt{\lim_{x \to 1} \frac{\ln x}{x^{4} - 1}} = \sqrt{\lim_{x \to 1} \frac{1}{x^{2}}} = \sqrt{\lim_{x \to 1} \frac{1}{x^{2}}}$ c, $\lim_{x \to 0} \frac{x^{2} \cdot e^{x}}{\sin^{2} 3x}$ $= \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x} - 1$ $= \lim_{x \to 0} 3\sin 6x - x \to 0$ 18 us $6x = 3$		xxe (x-e lnx)	
15 a, $\lim_{x \to +\infty} (e^{x} - x^{2})$ $= \lim_{x \to +\infty} (e^{x} (1 - \frac{x^{2}}{e^{x}})) = \infty$ b, $\lim_{x \to 1} \frac{\ln x}{x^{4} - 1}$ $= \sqrt{\lim_{x \to 1} \frac{\ln x}{x^{4} - 1}} = \sqrt{\lim_{x \to 1} \frac{1}{x^{2}}} = \sqrt{\lim_{x \to 1} \frac{1}{x^{2}}}$ c, $\lim_{x \to 0} \frac{x^{2} \cdot e^{x}}{\sin^{2} 3x}$ $= \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \lim_{x \to 0} 2x e^{x} + 2e^{x} - 1$ $= \frac{1}{x^{2}} = \frac{1}{x^{$		lim (1-lnx). lim (1)	
15 a, $\lim_{x \to +\infty} (e^{x} - x^{2})$ $= \lim_{x \to +\infty} (e^{x} (1 - \frac{x^{2}}{e^{x}})) = \infty$ b, $\lim_{x \to 1} \sqrt{\ln x}$ $= \sqrt{\lim_{x \to 1} x^{2} - 1}$ $= \sqrt{\lim_{x \to 1} x^{2} - 1}$ c, $\lim_{x \to 0} x^{2} \cdot e^{x}$ $= \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2} - \lim_{x \to 0} e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x}$ $= \lim_{x \to 0} 3\sin 6x - x \to 0$ 18 us $6x = 3$			
15 a, $\lim_{x \to +\infty} (e^{x} - x^{2})$ $= \lim_{x \to +\infty} (e^{x} (1 - x^{2})) = \infty$ b, $\lim_{x \to 1} \sqrt{n^{x} - 1}$ $= \sqrt{\lim_{x \to 1} \ln x}  \sqrt{\lim_{x \to 1} \frac{1}{x^{2} - 1}}$ $= \sqrt{\lim_{x \to 1} \ln x}  \sqrt{\lim_{x \to 1} \frac{1}{x^{2}}}  \sqrt{\lim_{x \to 1} \ln x^{2} - 1}$ c, $\lim_{x \to 0} \frac{n^{2} \cdot e^{x}}{\sin^{2} 3x}$ $= \lim_{x \to 0} 2x e^{x} + e^{x} \cdot x^{2}  \lim_{x \to 0} e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x}  1$ $= \lim_{x \to 0} 3\sin 6x  x \to 0  18 \cos 6x  3$			that ou it
15 a, $\lim_{\chi \to +\infty} (e^{\chi} (1 - \frac{\chi^2}{e^{\chi}})) = \infty$ .  b, $\lim_{\chi \to +\infty} \left( \ln \frac{\ln \chi}{e^{\chi}} \right) = \infty$ .  - $\lim_{\chi \to +\infty} \ln \frac{\ln \chi}{\chi^{\alpha} - 1}$ - $\lim_{\chi \to +\infty} \ln \frac{1}{\chi^{\alpha} - 1}$ - $\lim_{\chi $			THE STATE OF THE S
$= \lim_{x \to +\infty} \left( e^{x} \left( 1 - \frac{x^{2}}{e^{x}} \right) \right) = \infty .$ $b, \lim_{x \to 1} \frac{\ln x}{x^{4} - 1}$ $= \lim_{x \to 1} \frac{\ln x}{x^{4} - 1}$ $c, \lim_{x \to 0} \frac{x^{2} \cdot e^{x}}{\sin^{2} 3x}$ $\lim_{x \to 0} \frac{2x e^{x} + e^{x} \cdot x^{2}}{3\sin 6x} = \lim_{x \to 0} \frac{e^{x} \cdot x^{2} + 4e^{x} \cdot x}{18 \cos 6x} = \frac{1}{3}.$	15	a, lim (e - ~)	E Re de
b) $\lim_{x \to 1} \sqrt{\frac{\ln x}{x^4 - 1}}$ $= \sqrt{\lim_{x \to 1} \frac{\ln x}{x^4 - 1}} = \sqrt{\lim_{x \to 1} \frac{1}{x}}$ $= \sqrt{\lim_{x \to 1} \frac{x^4 - 1}{x^4 - 1}} = \sqrt{\lim_{x \to 1} \frac{1}{4x^3}}$ $= \lim_{x \to 0} \frac{x^2 \cdot e^x}{\sin^2 3x}$ $= \lim_{x \to 0} \frac{2x \cdot e^x}{3\sin 6x} + e^x \cdot x^2 + 4e^x \cdot x + 2e^x = 1$ $= \frac{1}{x^{2}} = \frac{1}$		X 2 4 00	
b, $\lim_{x \to 1} \sqrt{\frac{\ln x}{x^4 - 1}}$ - $\lim_{x \to 1} x^4 - 1$ - $\lim_{x \to 1} x^2 \cdot e^x$ - $\lim_{x \to 0} x^2 \cdot e^x$ - $\lim_{x \to 0} 2x e^x + e^x \cdot x^2$ - $\lim_{x \to 0} 3x \sin 6x$ - $\lim_{x \to 0} 3x \sin 6x$ - $\lim_{x \to 0} 3x \sin 6x$ - $\lim_{x \to 0} 3x \cos 6x$ - $\lim_{x \to 0} 3x \sin 6x$ - $\lim_{x \to 0} 3x \cos 6x$		= $\lim_{x \to \infty} \left( e^{x} \left( 1 - \frac{\lambda}{2x} \right) \right) = \infty$	4) (452 Tarous)
$= \sqrt{\lim_{x \to 1} \frac{\ln x}{x^4 + 1}} - \sqrt{\lim_{x \to 1} \frac{1}{4x^3}} - \sqrt{\lim_{x \to 1} \frac{1}{x^4 + 1}} - \sqrt{\lim_{x \to 1} \frac{1}{4x^3}} - \sqrt{\lim_{x \to 1} \frac{x^2 \cdot e^x}{\sin^2 3x}} $ $= \lim_{x \to 0} \frac{x^2 \cdot e^x}{\sin^2 3x} - \lim_{x \to 0} \frac{e^x \cdot x^2 + 4e^x \cdot x}{3\sin 6x} + 2e^x - \sqrt{\lim_{x \to 0} \frac{1}{3\sin 6x}} - \frac{1}{3\cos 6x} - 1$			DE-5 6-
$= \sqrt{\lim_{x \to 1} \frac{\ln x}{x^4 - 1}} \sqrt{\lim_{x \to 1} \frac{1}{4x^3}} \sqrt{\lim_{x \to 1} \frac{1}{4x^3}} \sqrt{\lim_{x \to 1} \frac{1}{x^4 - 1}} \sqrt{\lim_{x \to 1} \frac{1}{4x^3}} \sqrt{\lim_{x \to 1} \frac{x^2 \cdot e^x}{\sin^2 3x}} \sqrt{\lim_{x \to 0} \frac{x^2 \cdot e^x}{3\sin 6x}} \sqrt{\lim_{x \to 0} \frac{e^x \cdot x^2 + 4e^x \cdot x}{18\cos 6x}} \sqrt{\lim_{x \to 0} \frac{1}{3\sin 6x}} \sqrt{\lim_{x \to 0} \frac{1}{3\sin 6x}} \sqrt{\lim_{x \to 0} \frac{1}{3\cos 6x}} $		b) lim V lnr	THE B
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			
c, $\lim_{x \to 0} \frac{x^2 \cdot e^x}{\sin^2 3x}$ = $\lim_{x \to 0} \frac{2x e^x + e^x \cdot x^2}{3\sin 6x} = \lim_{x \to 0} \frac{e^x \cdot x^2 + 4e^x \cdot x}{18\cos 6x} = \frac{1}{9}$		lim Ink	)=(=);
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	(6)	(X-1) X-1 4X	triol of the
$= \lim_{x \to 0} \frac{2xe^{x} + e^{x} \cdot x^{2}}{3\sin 6x} = \lim_{x \to 0} \frac{e^{x} \cdot x^{2} + 4e^{x} \cdot x + 2e^{x}}{18\cos 6x} = \frac{1}{9}.$		c, lim 10 er	
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- (ept) 0 = 20/00 20 2 (3+6) = (10/00) 200		ent of adapting Country	1 ad 20 1 40

 $4 \quad y = x \tan \left(\frac{\pi x}{x}\right)$   $y' = \tan \frac{\pi x}{x} + x \cdot \frac{\pi \sec^2\left(\frac{\pi x}{x}\right)}{x}$  $-\frac{1}{2};\frac{1}{2}$   $\Rightarrow$   $y' = \tan T + \frac{\pi}{4} \cdot \sec^2(\frac{\pi}{4})$ +7 4x - 3y + 1 = 0.  $-7 y = \frac{4}{3}x + \frac{1}{3}$ . -> 4x2 = - 2/x3 6 +)  $x^3 - ny + y^3 = 0$ .  $\Rightarrow \frac{dy}{dx} (x^3 - ny + y^3) = 0$ .  $\Rightarrow \frac{3x^2 - y - x}{dx} + \frac{3y^2}{dx} + \frac{3y^2}{dx} = 0.$   $\Rightarrow \left(\frac{3y^2 - x}{dx}\right) = \frac{3x^2}{dx}.$ t) The tangent line is paralled to the x exist y the slope of the fangent is zero.

 $\frac{1}{3}y - 3n^2 = 0.$ +)  $A(t; 3t^2)$ -)  $t^3 - 3t^3 + 2t^6 = 0$ . -)  $2t^6 - 2t^3 = 0$  (=) t = 0  $t = \frac{3\sqrt{2}}{3}$  ->  $x = \frac{3\sqrt{2}}{3}$ ,  $y = 3\sqrt{4}$ . +, So A  $\left(\frac{3\sqrt{2}}{3}, \frac{\sqrt[3]{4}}{3}\right)$  $\frac{7}{dx} = \frac{y - 3x^2}{3y^2 - x}$ +)  $3y^2 - x = 0$  -> x = 3y. +)  $A(3t^2; t)$ . 7 27t6 - 2t3 = 0 => t= 31/2 +, So A (3/4; 3/2)