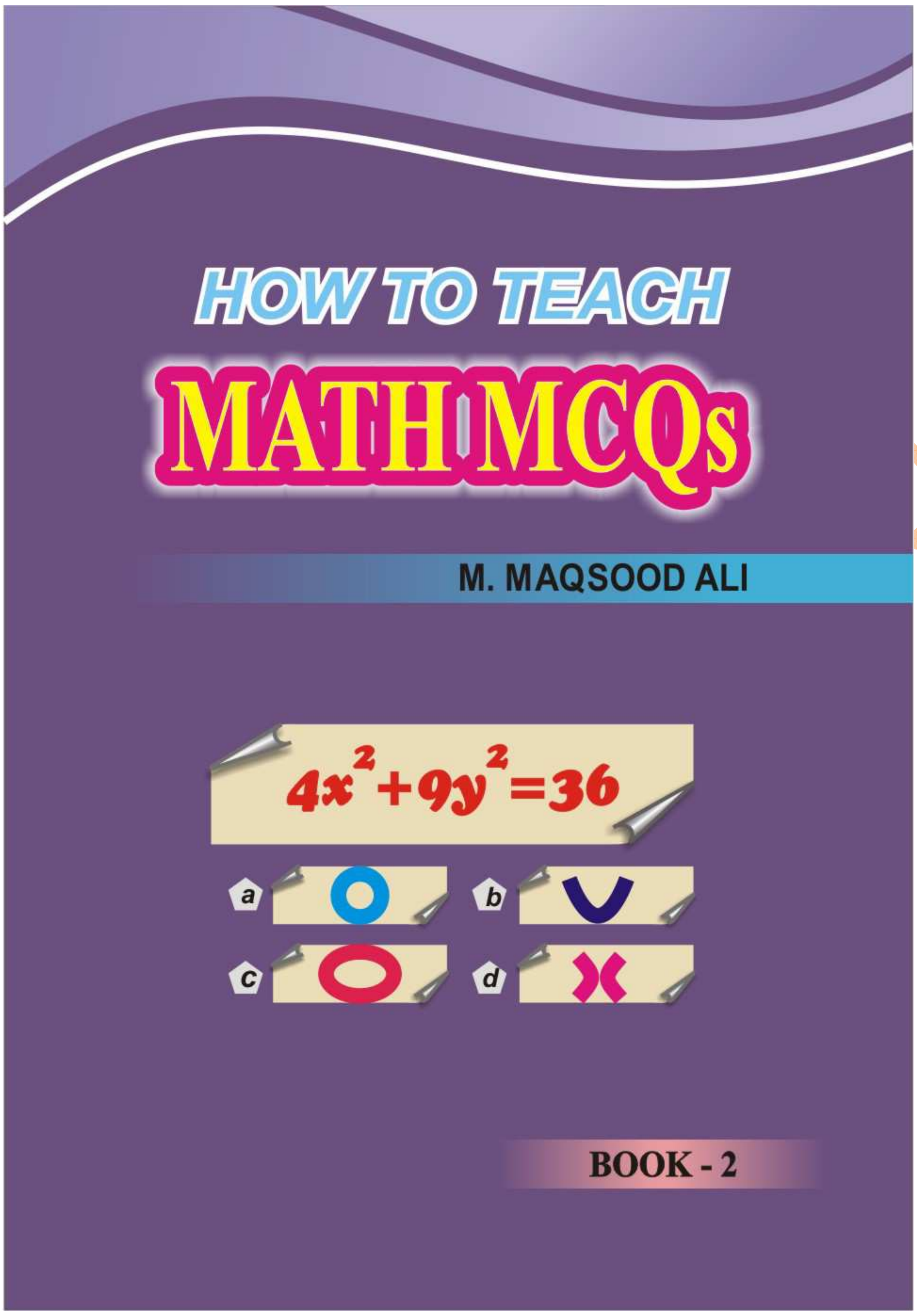
HOW TO TEACH
MATH MCQs
M. MAQSOOD ALI
$4x^2+9y^2=36$
a
b
c
d
BOOK - 2

Chapter 4

DERIVATIVES

Power constant and base variable:

i) Derivative of x^n w.r.t. x:

base $\leftarrow x^{n} \ {}^{\rightarrow power}$

$$\frac{d}{dx}\left(x^n\right) = ?$$

Multiply power (n) to the coefficient of x^n and subtract 1 from the power (n).

$$\frac{d}{dx}\left(x^n\right) = nx^{n-1}$$

Explanation:

$$\frac{d}{dx}(5x^9 - 9x + 6) = ?$$

Derivative of each term one by one.

i) $\frac{d}{dx}(5x^9)$

Multiply power 9 to 5 (the coefficient of x^9) and subtract 1 from 9 (power of x)

$$\frac{d}{dx}(5x^9) = 45x^8$$

ii) $\frac{d}{dx}(9x) = 9\frac{d}{dx}(x) = 9\frac{dx}{dx} = 9(1) = 9$

iii) $\frac{dx}{dx}(6) = 0$

So that

$\frac{d}{dx}\left(5x^9 - 9x + 6\right) = 45x^8 - 9$

MCQ-1 :

$\frac{d}{dx}(5x^9 - 9x + 6) = ?$

(a) $45x^8 - 1$ (b) $5x^8 - 9$ (c) $45x^7 - 9x$ (d) $45x^8 - 9$

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Derivative of a function $f(x)$ of power n:

base (function of x) ← $f^{\text{n} \to power}$

$$\frac{d}{dx} f^n(x) = ?$$

Multiply power (n) to the coefficient of $f(x)$ and than subtract 1 from the power (i.e. n), and than differentiate the base (i.e. $f(x)$) w.r.t x (i.e.$f'(x)$), multiply $f'(x)$ to $nf^{n-1}(x)$

$$\frac{d}{dx} f^n(x) = nf^{n-1}(x).\ f'(x)$$

Case-1: $f(x)$ in terms of $\{g(x)\}^n$:

Explanation:

$\frac{d}{dx}(6x^4 - 3)^8 = ?$

Power : 8

Base : $6x^4 - 3$

Multiply power 8 with 1 (coefficient of the base) and subtract 1 from 8 (power) and then differentiate the base ($6x^4 - 3$).

$$\frac{d}{dx}(6x^4 - 3)^8 = 8(6x^4 - 3)^{8-1}.\frac{d}{dx}(6x^4 - 3)$$

$$= 8(6x^4 - 3)^7.(24x^3)$$

$$= 192x^3(6x^4 - 3)^7$$

MCQ- 3:

$$\frac{d}{dx}(6x^4 - 3)^8 = ?$$

(a) $192x^3(6x^4 - 3)^7$ (b) $8(6x^4 - 3)^7$

(c) $8x^3(6x^4 - 3)^7$ (d) $48(6x^4 - 3)^7$

Solution:

$$\frac{d}{dx}(6x^4 - 3)^8 = 8(6x^4 - 3)^{8-1}.\frac{d}{dx}(6x^4 - 3)$$

$$= 8(6x^4 - 3)^7.(24x^3)$$

$$= 192x^3(6x^4 - 3)^7$$

The answer is (a).

EXERCISE-2

(1) $\frac{d}{dx}\left(5\sqrt{x^2+1}\right)$ =?

(a) $\frac{5x}{\sqrt{x^2+1}}+\sqrt{x^2+1}$ (b) $\frac{5}{2\sqrt{x^2+1}}$ (c) $\frac{5x}{\sqrt{x^2+1}}$ (d) $\frac{5\sqrt{x^2+1}}{x}$

(2) $\frac{d}{dx}\sqrt[3]{(x^2+1)^2}$ =?

(a) $12x(x^2+1)$ (b) $\frac{2x}{3(x^2+1)^{2/3}}$ (c) $\frac{4x}{3\,.\sqrt[3]{x^2+1}}$ (d) $\frac{4x}{\sqrt{x^2+1}}$

(3) $\frac{d}{dx}\left(\frac{1}{x^3+1}\right)$ =?

(a) $\frac{1}{3x^2}$ (b) $-3x^2(x^3+1)^2$ (c) $\frac{-3x^2}{(x^3+1)^2}$ (d) $3x^2(x^3+1)^2$

(4) $\frac{d}{dx}\sqrt{3x+1}$ =?

(a) $\frac{3}{2}(3x+1)^{1/2}$ (b) $\frac{(3x+1)^{1/2}}{3}$ (c) $\frac{3}{\sqrt{3x+1}}$ (d) $\frac{3}{2\sqrt{3x+1}}$

(5) $\frac{d}{dx}(200+3\sqrt{x^3})$ =?

(a) $1+\frac{9}{2}\sqrt{x}$ (b) $\frac{9}{2}\sqrt{x}$ (c) $\frac{9}{2\sqrt{x}}$ (d) $\frac{9}{2}x^{\frac{3}{2}}$

(6) $\frac{d}{dx}(\sqrt[5]{x^2}+5)$ =?

(a) $\frac{2}{5\,.\sqrt[5]{x^3}}$ (b) $\frac{1}{5x^{\frac{4}{5}}}$ (c) $2x\sqrt[5]{x}$ (d) $\frac{2}{5x^{\frac{3}{5}}}+1$

(7) If $f(x)=(4+x^2)^{-2/3}$, then $f'(2)$ =?

(a) $-\frac{3}{7}$ (b) $-\frac{5}{48}$ (c) $-\frac{1}{48}$ (d) $-\frac{1}{12}$

(8) If $g(x)=\sqrt{5-x}$, then $g'(1)$ =?

(a) $-\frac{1}{5}$ (b) $\frac{1}{4}$ (c) $-\frac{1}{4}$ (d) $\frac{5}{4}$

(9) If $f(x)=(5x+3)^2$, then $f'(2)$ =?

(a) 13 (b) 169 (c) 26 (d) 130

TRIGONOMETRIC FUNCTIONS

Formulae:

(i) $\frac{d}{dx} sinx = cosx$

(ii) $\frac{d}{dx} cosx = -sinx$

(iii) $\frac{d}{dx} tanx = sec^2x$

(iv) $\frac{d}{dx} cosecx = - cosecx\ cotx$

(v) $\frac{d}{dx} secx = secx\ tanx$

(vi) $\frac{d}{dx} cotx = -cosec^2x$

Case-2: $f(x)$ in terms of trigonometric functions:

(i) Power $= n = 1$ and angle x :

MCQ-4 :

$\frac{d}{dx} sinx = ?$

(a) $-cosx$ (b) $cosx$ (c) $sinxcosx$ (d) $\cos^2x$

Solution:

$$\frac{d}{dx} sinx$$

$$= cosx$$

The answer is (b).

(ii) Power= $n \neq 1$ and angle :

MCQ-5 :

$\frac{d}{dx}(2sin^5x) = ?$

(a) $2\cos^5x$ (b) $10\sin^4x$ (c) $10\ sinxcosx$ (d) $5\sin^4xcosx$

Solution:

Power = 5

Base (function) $= sinx$

Multiply 5 (power) to 2 (coefficient of $sinx$) and subtract 1 from 5 and than differentiate $sinx$ (base) in product.

$$\frac{d}{dx}(2sin^5)$$

$$= 10\sin^{5-1}x.\frac{d}{dx}(\sin x)$$

$$= 10\sin^4 x\cos x$$

The answer is (d).

(iii) Power= $n = 1$ and angle= $u(x)$:

Function = sin
Angle = $3x$
Derivative in two steps.
Differentiate sin (function) and then $3x$ (angle) , in product.

$$\frac{d}{dx}\sin 3x$$

$$= \cos 3x.\frac{d}{dx}(3x)$$

$$= \cos 3x.(3)$$

$$= 3\cos 3x$$

The answer is (c).

(iv) Power = $n \neq 1$, angle = $u(x)$

MCQ-6 :

$\frac{d}{dx}(2\sin^5 3x) = ?$

(a) $30\sin^4 3x\cos 3x$ (b) $10\sin^4 3x\cos 3x$

(c) $30\sin 3x\cos 3x$ (d) $30\sin^4 3x$

Solution:

Power= 5
Base (function) = sin
Angle = $3x$
Derivative in three steps (Power, function, angle)

$$\frac{d}{dx}(2\sin^5 3x) = 2 \times 5\sin^{5-1}\frac{d}{dx}(\sin 3x)$$

$$= 10\sin^4 3x.\cos 3x\frac{d}{dx}(3x)$$

$$= 10\sin^4 3x.\cos 3x.(3)$$

$$= 30\sin^4 3x\cos 3x$$

The answer is (a).

EXERCISE-3

(1) $\frac{d}{dx}(\cos x + \sin x) = ?$

(a) $\sin x - \cos x$ (b) $\cos x - \sin x$ (c) $\sin x + \cos x$ (d) $\cos x + \sin x$

(2) $\frac{d}{dx}\sin x^4 = ?$

(a) $4x^3 \sin x^4$ (b) $4x^3 \sin x^4 \cos x$ (c) $4x^3 \cos x^4$ (d) $\sin x^4 \cos x^4$

(3) $\frac{d}{dx}(10 + \tan x^2) = ?$

(a) $1 + sec^2\, x^2$ (b) $2x\, sec^2\, x^2$ (c) $2x\, sec^2\, x$ (d) $1 + 2x\, sec^2\, x^2$

(4) $\frac{d}{dx}\left(cos^3 x^2\right) = ?$

(a) $-6x\ \sin x^2\, cos^2\, x^2$ (b) $-6x\ \ cos^2 x \sin \mathrm{x}$

(c) $6x\, cos^2\, x^2$ (d) $-6\, sin^2\, \mathrm{x} \cos \mathrm{x}$

(5) $\frac{d}{dx}\sqrt{\tan\ x} = ?$

(a) $\frac{\sec\ x}{2\sqrt{\tan\ x}}$ (b) $\frac{1}{2\sqrt{tan\ x}.\sec x}$ (c) $\frac{sec^2 x}{2\sqrt{\tan\ x}}$ (d) $\frac{1}{2\sqrt{\tan x}\ \ \sec x}$

(6) $\frac{d}{dx}\cot x^3 = ?$

(a) $3\, cot^2 x$ (b) $3 \cot\ x^2$ (c) $-3x^2\, cosec^2\, x$ (d) $-3x^2\, cosec^2\, x^3$

(7) $\frac{d}{dx}\ \mathrm{cosec}^2\ x = ?$

(a) $\frac{-2 \cos\ x}{sin^3 x}$ (b) $2\ cosec^2\ x\ \cot x$

(c) $-2\ \ \mathrm{cosec}\, x \cot x$ (d) $\frac{-\ cosec\ x}{\cot x}$

(8) $\frac{d}{dx}\sec\left(2x^2\right) = ?$

(a) $4x \sec x \tan x$ (b) $\sec(2x^2)\tan(2x^2)$

(c) $4x\ \ \sec(2x^2)\tan(2x^2)$ (d) $4x\ \ \sec^2(2x^2)$

INVERSE TRIGONOMETRIC FUNCTIONS

Formulae:

(i) $\frac{d}{dx} sin^{-1}x = \frac{1}{\sqrt{1-x^2}}$ (ii) $\frac{d}{dx} cos^{-1}x = \frac{-1}{\sqrt{1-x^2}}$

(iii) $\frac{d}{dx} tan^{-1}x = \frac{1}{1+x^2}$ (iv) $\frac{d}{dx} cot^{-1}x = \frac{-1}{1+x^2}$

(v) $\frac{d}{dx} sec^{-1}x = \frac{1}{x\sqrt{x^2-1}}$ (vi) $\frac{d}{dx} cosec^{-1}x = \frac{-1}{x\sqrt{x^2-1}}$

NATURAL LOG (lnx)

Formula:

(i) $\frac{d}{dx}\ lnx = \frac{1}{x}$ (i)i $\frac{d}{dx} ln\, u\ = \frac{1}{u} . \frac{d}{dx} u$

where $u = u(x)$

Properties:

(i) $log_e x = lnx$ (ii) $log_{10} x = logx$

(iii) $\ln(a.b) = lna + lnb$ (iv) $\ln\left(\frac{a}{b}\right) = lna - lnb$

(v) $lna^x = x\ lna$ (vi) $e^{lnx} = x$

(vii) $lne^x = x$

MCQ- 7:

$\frac{d}{dx} lnx^3 =?$

(a) $1/x^3$ (b) $3/x^3$ (c) $3/x$ (d) $3x^5$

Solution:

Derivative in two steps.

$\frac{d}{dx} lnx^3 = \frac{1}{x^3} . \frac{d}{dx}(x^3)$ $\{\because \frac{d}{dx} ln\, u\ = \frac{1}{u} . \frac{d}{dx} u$

$= \frac{1}{x^3} . (3x^2)$

$= 3/x$

The answer is (c).

MCQ-8 :

$\frac{d}{dx}\ \{\ln(x^2 + 3)\}^5 =?$

(a) $\frac{5}{x^2+3}$ (b) $\frac{5\{\ln(x^2+3)\}^4}{x^2+3}$

(c) $10x\ \{ln(x^2 + 3)\}^4/\ (x^2+3)$ (d) $10\ \{\ ln\ (x^2 + 3)\}^4/\ (\ x^2+3\ )$

Solution:

Derivative in three steps :

$\frac{d}{dx}\{\ln(x^2+3)\}^5 = 5\{\ln(x^2+3)\}^4 . \frac{d}{dx}\ln(x^2+3)$

$= 5\{\ln(x^2+3)\}^4 . \frac{1}{x^2+3} . \frac{d}{dx}(x^2+3)$

$= 5\{ln(x^2+3\}^4 . \frac{1}{x^2+3} . (2x)$

$= \frac{10x\{\ln(x^2+3)\}^4}{x^2+3}$

The answer is (c).

MCQ-9 :

$\frac{d}{dx}(lnx)^8 = ?$

(a) $1/x^8$ (b) $8(lnx)^7/x$ (c) $8(lnx)^7$ (d) $1/x$

Solution:

Derivative in two steps.

power = 8

base = lnx

$\frac{d}{dx}(lnx)^8 = 8(lnx)^7 . \frac{d}{dx}(lnx)$

$= 8(lnx)^7 . \frac{1}{x}$

$= 8(lnx)^7/x$

The answer is (b).

EXERCISE-5

(1) $\frac{d}{dx} ln(x^3+1) = ?$

(a) $\frac{3x}{1+x^3}$ (b) $\frac{1}{x^3+1}$ (c) $\frac{1}{x^3+1} ln(x^3+1)$ (d) $\frac{3x^2}{1+x^3}$

(2) $\frac{d}{dx} ln\sqrt{x+1} = ?$

(a) $\frac{1}{2}\sqrt{x+1}$ (b) $\frac{1}{\sqrt{x+1}}$ (c) $\frac{1}{2(x+1)}$ (d) $\frac{1}{2\sqrt{x+1}}$

(3) $\frac{d}{dx}\ ln\sqrt{\sin x}\ =?$

(a) $\frac{1}{2\sqrt{\sin x}}$ (b) $\frac{\cos x}{2\sqrt{\sin x}}$ (c) $\frac{1}{2}\ \tan x$ (d) $\frac{1}{2}\cot x$

(4) $\frac{d}{dx}\sqrt{\sin^{-1}x}\ =?$

(a) $\frac{\sin x}{2\sqrt{1-x^2}}$ (b) $\frac{1}{2\sqrt{1-x^2}\,sin^{-1}x}$ (c) $\frac{\cos^{-1}x}{2\sqrt{\sin^{-1}x}}$ (d) $\frac{\sqrt{\sin^{-1}x}}{2\sqrt{1-x^2}}$

(5) $\frac{d}{dx}\cot^{-1}(ln\ e^{x})\ =?$

(a) $\frac{-1}{1+x^2}$ (b) $\frac{1}{\cot^{-1}e^{x}}$ (c) $\frac{\cot^{-1}x}{e^{x}}$ (d) $\frac{-1}{1+(ln\ e^{x})^2}$

(6) $\frac{d}{dx}\ 10^{\log\sin x}\ =?$

(a) $\sin x$ (b) $\cot x\ 10^{\log\sin x}$ (c) $\cos x$ (d) $\log\cos x$

(7) $\frac{d}{dx}\ ln\ e^{\sin(sin^{-1}x)}\ =?$

(a) $\frac{1}{e^{\sin(sin^{-1}x)}}$ (b) $\frac{sin^{-1}x}{x}$ (c) $\frac{1}{e^{x}}$ (d) 1

(8) $\frac{d}{dx}\ ln\left(e^{2x^3+9}\right)\ =?$

(a) $6x^2$ (b) $\frac{6x^2}{2x^3+9}$ (c) $ln\ (2x^3+9)$ (d) $6x^2e^{2x^3+9}$

(9) $\frac{d}{dx}\ ln\left(e^{x}.\,10^{x^2}\right)\ =?$

(a) $\frac{1}{e^{x}.10^{x^2}}$ (b) $1+2x\ ln\ 10$ (c) $e^{x}(10^{x^2}+2x)$ (d) $\frac{2x}{e^{x}+10^{x^2}}$

(10) $\frac{d}{dx}\ ln\left(\frac{e^{x^3}}{5^{x}}\right)\ =?$

(a) $3x^2-\ In\ 5$ (b) $\frac{3x^2e^{x^3}}{5^{x}\ In\ 5}$ (c) $\frac{3x^2}{5^{x}\ In\ 5}$ (d) $\frac{5^{x}\ In\ 5}{3x^2e^{x^3}}$

(11) $\frac{d}{dx} ln(\sin x \,.\, \cos x)$ =?

(a) $\frac{1}{\sin x \ \cos x}$ (b) $\frac{\sin x + \cos x}{\sin x \ \cos x}$ (c) $\cot x - \tan x$ (d) $\cos x - \sin x$

(12) $\frac{d}{dx}\ e^{In\, x^3}$ =?

(a) $3x^2\ \ e^{In\, x^3}$ (b) $3x^2$ (c) $e^{In\, x^3}$ (d) $\frac{e^{In\, x^3}}{x^3}$

(13) $\frac{d}{dx}(\sec 3x + ln(5x)^3)$ =?

(a) $\sec 3x \tan 3x + 3ln(5x)^2$ (b) $3\ \sec x \tan x + \frac{5}{(5x)^3}$

(c) $3(\sec 3x \tan 3x + x)$ (d) $3\ \frac{(x\ sec3x \tan 3x + 1)}{x}$

EXPONENTIAL x

Formula:

(i) $\frac{d}{dx}e^x = e^x$

(ii) $\frac{d}{dx}e^u = e^u.\frac{du}{dx}$ {where $u = u(x)$

Explanation:

$$y = e^x$$
$$lny = lne^x$$
$$= x\ lne$$
$$= x(1)$$
$$= x$$

Differentiate w.r.t . x

$$\frac{d}{dx}(lny) = \frac{d}{dx}(x)$$
$$\frac{1}{y}.\frac{dy}{dx} = 1$$
$$\frac{dy}{dx} = y$$
$$\frac{dy}{dx} = e^x$$

MCQ-10 :

$\frac{d}{dx}e^{5x^3+2}$ =?

(a) $(5x^3 + 2)e^{5x^3+2}$
(b) e^{5x^3+2}
(c) e^{15x^2}
(d) $15x^2e^{5x^3+2}$

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MCQ-12 :

$\frac{d}{dx}\ 5^{(x^{3}+1)}\ =?$

(a) $5^{(x^3+1)}.ln15x^2$ (b) $3x^2.5^{(x^3+1)}.ln5$

(c) $5^{(x^3+1)}.ln5$ (d) $(x^3+1)5^{x^3}$

Solution:

$$\frac{d}{dx}5^{(x^3+1)} = 5^{(x^3+1)}\cdot ln5.\frac{d}{dx}\left(x^3+1\right)$$

$$= 5^{(x^3+1)}.ln5(3x^2)$$

$$= 3x^2 5^{(x^3+1)}.ln5$$

The answer is (b).

EXERCISE-6

(1) $\frac{d}{dx}\left(e^{5x^2}.4\right) =?$

(a) $e^{5x^2}+40xe^{5x^2}$ (b) $20\ x\ In\ (5x^2)$ (c) $40e^{5x^2}$ (d) $40\ x\ e^{5x^2}$

(2) $\frac{d}{dx}\left(\sin\ 2x+e^{3x^2}\right) =?$

(a) $2\cos\ 2x+6x\,e^{3x^2}$ (b) $2\sin 2x\cos\ 2x+6x\,e^{3x^2}$

(c) $2(\cos x+3xe^{6x})$ (d) $None$

(3) $\frac{d}{dx}e^{x^2+9} =?$

(a) e^{2x} (b) $2x\,e^{x^2+9}$ (c) $(2x+1)e^{x^2+9}$ (d) $2x\ In\ (x^2+9)$

(4) $\frac{d}{dx}\left(e^{x^2}.e^{\tan x}\right) =?$

(a) e^{2x+sec^2x} (b) $(2x+sec^2 x)e^{x^2+tanx}$

(c) $2x+sec^2 x$ (d) $2x\ sec^2 x e^{x^2}e^{\tan x}$

(5) $\frac{d}{dx}e^{\cos x}+5 =?$

(a) $-\sin x\,e^{\cos x}+5$ (b) $e^{-\sin x}$ (c) $-\sin x\,e^{\cos x}$ (d) $5+\frac{1}{e^{\sin x}}$

PRODUCT RULE

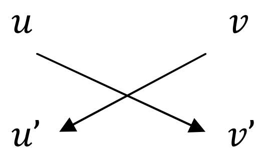
if u and v are derivable function of x, then

$$\frac{d}{dx}(u.v) = u.\frac{dv}{dx} + v.\frac{du}{dx}$$

or

$$(u.v)' = u.v' + v.u'$$

Shortcut:



$$u.v' + v.u'$$

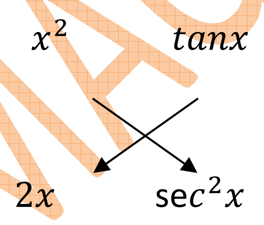
MCQ- 13:

$\frac{dy}{dx}$ =? , if $y = x^2 tanx$

(a) $2x\,\sec^2 x$ (b) $x^2\,sec^2 x$

(c) $x^2 sec2x\,tanx$ (d) $x^2 sec^2 x + 2xtanx$

Solution:



$$\frac{dy}{dx} = x^2 sec^2 x + 2xtan\,x$$

The answer is (d).

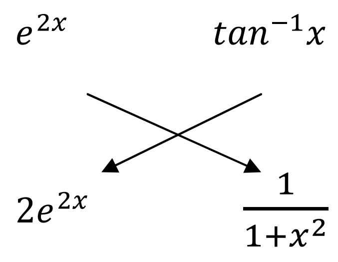
MCQ-14 :

$\frac{dy}{dx} = ?$, if $y = e^{2x}\ \tan^{-1} x$

(a) $\frac{e^{2x}}{1+x^2} + 2e^{2x} tan^{-1} x$ (b) $e^{2x} sec^{-1} x + 2e^{2x} tan^{-1} x$

(c) $\frac{e^{2x}}{\sqrt{1-x^2}} + e^{2x} tan^{-1} x$ (d) $e^{2x}(1 + x^2) + e^{2x} tan^{-1} x$

Solution:



$$\frac{dy}{dx} = \frac{e^{2x}}{1+x^2} + 2e^{2x} tan^{-1} x$$

The answer is (a).

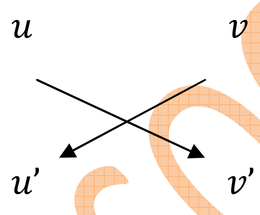
QUOTIENT RULE

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\,\frac{du}{dx} - u.\frac{dv}{dx}}{v^2}$$

or

$$\left(\frac{u}{v}\right)' = \frac{vu' - uv'}{v^2}$$

Shortcut:



$$v.u' - u.v'$$

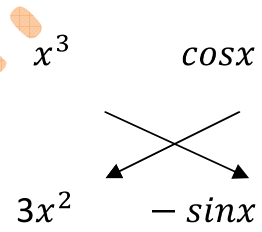
MCQ- 15:

$\frac{dy}{dx}$ =? , if $y = {x^3}/_{cosx}$

(a) $(-x^3 sinx - 3x^2 cosx)/cos^2x$ (b) $-3x^2/sinx$

(c) $(3x^2 cosx + x^3 sinx)/cos^2x$ (d) $(3x^2 cosx - x^3 sinx)/cos^2x$

Solution:



$$\frac{dy}{dx} = (3x^2 cosx + x^3 sinx) / \cos^2 x$$

The answer is (c).

EXERCISE-7

(1) $\frac{d}{dx}\left(x^2.\sin x\right) = ?$

(a) $x^2\sin x + 2x\cos x$ (b) $2x\cos x$ (c) $x^2\cos x + 2x\sin x$ (d) $x^2\cos x$

(2) $\frac{d}{dx}\left(x^3\cos^{-1}x\right) = ?$

(a) $-3x^2/\sqrt{1-x^2}$ (b) $-3x^2\cos^{-1}x - x^3\sin^{-1}x$

(c) $x^3\sqrt{1-x^2} + 3x^2\cos^{-1}x$ (d) $3x^2\cos^{-1}x - \frac{x^3}{\sqrt{1-x^2}}$

(3) $\frac{d}{dx}\left(\frac{lnx}{x}\right) = ?$

(a) $\frac{(1-lnx)}{x^2}$ (b) $\frac{(x-lnx)}{x^2}$ (c) 0 (d) $\frac{1}{x^2}$

(4) $\frac{d}{dx}\left(\frac{x}{e^x}\right) = ?$

(a) $1/e^x$ (b) $(x-e^x)/e^{2x}$ (c) $(xe^x-1)/e^{2x}$ (d) $(1-x)/e^x$

IMPLICIT EQUATIONS

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PARAMETRIC EQUATIONS

$$x = f(t) \quad , \quad y = g(t)$$

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

MCQ-17 :

$\frac{dy}{dx}$ =?, if $x = 6t^3$ and $y = 8t^2$?

(a) $\frac{9t}{8}$ (b) $\frac{8}{9t}$ (c) $48t^5$ (d) $\frac{16}{t}$

Solution:

$$x = 6t^3 \quad , \quad y = 8t^2$$

$$\frac{dx}{dt} = 18t^2 \quad , \quad \frac{dy}{dt} = 16t$$

$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt}$$

$$\frac{dy}{dx} = \frac{16t}{18t^2}$$

$$= \frac{8}{9t}$$

The answer is (b).

EXERCISE-9

(1) $x = t^2 + 3, y = 3t^3$. What is the value of $\frac{dy}{dx}$ at $t = 4$?

(a) $\frac{1}{18}$ (b) 1.8 (c) 18 (d) 36

(2) Given that $x = sin^2 t, y = cos^2 t$. What is the value of $\frac{dy}{dx}$ at $t = \frac{\pi}{6}$?

(a) -1 (b) $\frac{1}{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{\sqrt{2}}$

HIGHER DERIVATIVES

MCQ-18 :

$f''(2) = ?$, if $f(x) = 3x^4 - 16x$

(a) 144 (b) 72 (c) 92 (d) 108

Solution:

$$f(x) = 3x^4 - 16x$$
$$f'(x) = 12x^3 - 16$$
$$f''(x) = 36x^2$$
$$f''(2) = 36(2)^2$$
$$f''(2) = 144$$

The answer is (a).

EXERCISE-10

(1) If $f(x) = \sin x$, then $f''\left(\frac{\pi}{6}\right) = ?$

(a) $\frac{-\sqrt{3}}{2}$ (b) $\frac{1}{2}$ (c) $\frac{-1}{2}$ (d) $\frac{1}{\sqrt{2}}$

(2) If $f(x) = x^4 - x^2$, then $f'''(2)$=?

(a) 48 (b) 24 (c) 46 (d) 22

(3) If $y = e^{3x}$, then the value of y'' at $x = 0$ is__________.

(a) 0 (b) 9 (c) 1 (d) $9e^3$

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