BASIC DIFFERENTIATION

Class: IX, Mathematics (1)

SOLUTIONS (A)

TEACHING TASK

01. $\frac{d}{dx}\left(3\sqrt[3]{x} - \frac{4}{\sqrt[4]{x}}\right)$

$= 3 \cdot \frac{d}{dx}\left(x^{\frac{1}{3}}\right) - 4 \frac{d}{dx}\left(x^{-\frac{1}{4}}\right)$

$= 3 \cdot \frac{1}{3} \cdot x^{\frac{1}{3}-1} - 4 \cdot \left(-\frac{1}{4}\right) \cdot x^{-\frac{1}{4}-1}$

$= x^{-2/3} + x^{-5/4}$ Ans. B

02. $f(x) = \sqrt{ax} + \frac{a^2}{\sqrt{ax}}$

$\Rightarrow f(x) = \sqrt{a} \cdot \sqrt{x} + \frac{a^2}{\sqrt{a} \cdot \sqrt{x}}$

$\Rightarrow f'(x) = \sqrt{a} \cdot \frac{1}{2\sqrt{x}} + \frac{a^2}{\sqrt{a}} \cdot \left(\frac{-1}{2x^{3/2}}\right)$

$\therefore f'(a) = \sqrt{a} \cdot \frac{1}{2\sqrt{a}} - \frac{a^2}{2 \cdot \sqrt{a} \cdot a\sqrt{a}} = 0$ Ans. B

03. $f(x) = x - x^2 + x^3 - x^4 + \dots \infty$

$f'(x) = 1 - 2x + 3x^2 - 4x^3 + \dots$

$f'(x) = (1+x)^{-2}$ $\therefore f'(x) = \frac{1}{(1+x)^2}$ Ans. B

04. $x^4 + 7x^2y^2 + 9y^4 = 24xy^3$ (2)

$\Rightarrow 4x^3 + 7\left[x^2 \cdot 2y \cdot \frac{dy}{dx} + y^2 \cdot 2x\right] + 9 \cdot 4y^3 \frac{dy}{dx}$

$= 24\left[x \cdot 3y^2 \cdot \frac{dy}{dx} + y^3 \cdot 1\right]$

$\Rightarrow \frac{dy}{dx} = \frac{y}{x}$

Ans.. B

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05. $f(x) = \frac{1}{1+\frac{1}{x}}$

$f(x) = \frac{x}{x+1}$

$g(x) = \frac{1}{1+\left(\frac{x+1}{x}\right)} = \frac{x}{2x+1}$

$\therefore g'(x) = \frac{(2x+1) \cdot 1 - \cancel{x} \, x(2)}{(2x+1)^2}$

$g'(2) = \frac{(2 \cdot 2 + 1) - 2 \cdot 2}{(2 \cdot 2 + 1)^2} = \frac{1}{25}$ Ans.. B

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06. $y = 2^x \cdot 3^{2x} \cdot 5^{-x} \cdot 7^{-x}$

$y = \frac{2^x \cdot (3^2)^x}{5^x \cdot 7^x} \Rightarrow y = \left(\frac{2 \cdot 3^2}{5 \cdot 7}\right)^x$

$\therefore \frac{dy}{dx} = \left(\frac{2 \cdot 3^2}{5 \cdot 7}\right)^x \cdot \log\left(\frac{2 \cdot 3^2}{5 \cdot 7}\right)$

$\frac{dy}{dx} = \frac{2^x \cdot 3^{2x}}{5^x \cdot 7^x} \cdot \log\left(\frac{18}{35}\right)$

Ans: A

③

07. $\frac{d}{dx}\left(\frac{1+x^2+x^4}{1+x+x^2}\right)$

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

$= \frac{d}{dx}\left(\frac{\cancel{(x^2+1+x)}(x^2+1-x)}{\cancel{1+x+x^2}}\right)$

$= 2x-1 = ax+b$

$\therefore (a,b) = (2,-1)$

Ans: C

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08. $y = x.\tan\frac{x}{2}$

$\Rightarrow \frac{dy}{dx} = x.\sec^2\left(\frac{x}{2}\right)\cdot\frac{1}{2} + \tan\frac{x}{2}\cdot 1$

$\Rightarrow \quad = \frac{x}{2\cos^2\left(\frac{x}{2}\right)} + \frac{\sin\frac{x}{2}}{\cos\frac{x}{2}}$

$= \frac{x + 2\sin\frac{x}{2}\cos\frac{x}{2}}{2\cos^2\frac{x}{2}}$

$= \frac{x+\sin x}{1+\cos x}$

$\therefore (1+\cos x)\frac{dy}{dx} - \sin x = x$

Ans: D

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09 $(x+1)(x^2+1)(x^4+1)(x^8+1)$

$= \frac{(x-1)(x+1)(x^2+1)(x^4+1)(x^8+1)}{x-1} = \frac{x^{16}-1}{x-1}$

$$\frac{d}{dx}\left(\frac{x^{16}-1}{x-1}\right) = \frac{(x-1)(16\cdot x^{15}) - (x^{16}-1)(1)}{(x-1)^2}$$ ④

$$\Rightarrow \left(16\cdot x^{16} - 16x^{15} + x^{16} + 1\right)(x-1)^{-2}$$

$$= \left(15x^{16} - 16x^{15} + 1\right)(x-1)^{-2}$$

$$= \left(15x^{p} - 16x^{q} + 1\right)(x-1)^{-2}$$

$$\Rightarrow (p, q) = (16, 15)$$

Ans. D

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10. $\frac{d}{dx}\left[\log\left(\frac{x}{e^{\tan x}}\right)\right]$

$$= \frac{d}{dx}\left[\log\left(x\cdot e^{-\tan x}\right)\right]$$

$$= \frac{1}{x\cdot e^{-\tan x}}\left(x\cdot e^{-\tan x}(-\sec^2 x) + e^{-\tan x}\cdot 1\right)$$

$$= -\sec^2 x + \frac{1}{x}$$

Ans: B

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11. $f(x) = \frac{a - b\cos x}{a + b\cos x}$

$$f'(x) = \frac{(a+b\cos x)(b\sin x) - (a-b\cos x)(-b\sin x)}{(a+b\cos x)^2}$$

$$f'(x) = \frac{2ab\sin x}{(a+b\cos x)^2}$$

$$f'\left(\frac{\pi}{2}\right) = \frac{2b}{a}$$

$f'(0) = 0$

$f'(\pi) = 0$

Ans: A, B, C

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12. $f(x) = x \cdot \sin x$

$f'(x) = x\cos x + \sin x.$

$f'(0) = 0, \quad f'\left(\frac{\pi}{2}\right) = 1, \quad f'(\pi) = -\pi$

Ans.. A, B C

13. Statement I: $y = e^{x + 3\log x}$

$y = e^{x} \cdot e^{3\log x}$

$= e^{x} \cdot e^{\log x^3}$

$= x^3 \cdot e^{x}$

$\therefore \frac{dy}{dx} = x^3 \cdot e^{x} + e^{x} \cdot 3x^2$

$= e^{x} \cdot x^2(x+3)$ (True)

Statement II: Conceptual (True)

Ans: A

14. Statement I: $\frac{d}{dx}\left(1 - 2x + 3x^2 - 4x^3 \cdots\right)$

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

$= \frac{-2}{(1+x)^3}$ (True)

Statement II: Conceptual (True)

Ans.. A

15. $y = \exp\{\cos^2 x + \cos^4 x + \cos^6 x + \cdots\}$

$y = \exp\left\{\frac{\cos^2 x}{1 - \cos^2 x}\right\}$

$y = \cancel{\exp\{\tan^2 x\}}$

$y = \cancel{e^{\tan^2 x}}$

$\frac{dy}{dx} = \cancel{e^{\tan^2 x}} \cdot 2\tan x \cdot \sec^2 x$

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$y = \exp(\cot^2 x)$

$y = e^{\cot^2 x}$

$\frac{dy}{dx} = e^{\cot^2 x} \cdot 2\cot x \cdot (-\csc^2 x)$

$\frac{dy}{dx} = -2 \cdot e^{\cot^2 x} \cdot \cot x \cdot \csc^2 x.$

Ans: C

16. $y = \exp\{\sin^2 x + \sin^4 x + \sin^6 x + \cdots \infty\}$

$y = \exp\left\{\frac{\sin^2 x}{1 - \sin^2 x}\right\}$

$y = \exp\{\tan^2 x\}$

$y = e^{\tan^2 x}$

$y = e^{\tan^2 x} \cdot 2\tan x \cdot \sec^2 x$

Ans: ⟶

17. $\frac{d}{dx}\left[\frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1}\left(\frac{x}{a}\right)\right]$

$= \frac{x}{2} \cdot \frac{1}{2\sqrt{a^2 - x^2}} \cdot (-2x) + \sqrt{a^2 - x^2} \cdot \frac{1}{2} +$

$\frac{a^2}{2} \cdot \frac{1}{\sqrt{1 - \left(\frac{x}{a}\right)^2}} \cdot \frac{1}{a}$

$\therefore \frac{dy}{dx} = \sqrt{a^2 - x^2}$

Ans: A

18 $f(x) = \dfrac{\cos x + \sin x}{\cos x - \sin x}$

$f(x) = \dfrac{1 + \tan x}{1 - \tan x}$

$= \tan\left(\frac{\pi}{4} + x\right)$

$f'(x) = \sec^2\left(\frac{\pi}{4} + x\right)$ Ans. A

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19. $5^x + 5^y = 5^{x+y}$

$\Rightarrow 5^x \cdot \log 5 + 5^y \cdot \log 5 \cdot \frac{dy}{dx} = 5^{x+y} \cdot \log 5 \left(1 + \frac{dy}{dx}\right)$

$\Rightarrow 5^x + 5^y \frac{dy}{dx} = 5^{x+y}\left(1 + \frac{dy}{dx}\right)$

put $x = y = 1$

$\Rightarrow 5 + 5\frac{dy}{dx} = 25\left(1 + \frac{dy}{dx}\right)$

$= 1 + \frac{dy}{dx} = 5 + 5\frac{dy}{dx}$

$\Rightarrow 4\frac{dy}{dx} = -4$

$\Rightarrow \frac{dy}{dx} = -1$ Ans: -1

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20. $xy = (x+y)^n$

$\Rightarrow x \cdot \frac{dy}{dx} + y \cdot 1 = n(x+y)^{n-1}\left(1 + \frac{dy}{dx}\right)$

$\Rightarrow x\left(\frac{y}{x}\right) + y = n(x+y)^{n-1}\left(1 + \frac{y}{x}\right)$

$\Rightarrow \cancel{2y = n(x+y)^{n-1}\left(\frac{x+y}{x}\right)}$

$\Rightarrow$

20. Given $x^3 \cdot y^4 = (x+y)^n$

$x^3 \cdot 4y^3 \frac{dy}{dx} + y^4 \cdot 3x^2 = n(x+y)^{n-1} \cdot \left(1 + \frac{dy}{dx}\right)$

$\Rightarrow 4x^3y^3\left(\frac{y}{x}\right) + 3x^2y^4 = n(x+y)^{n-1}\left(1+\frac{y}{x}\right)$

$\Rightarrow 4x^2y^4 + 3x^2y^4 = \frac{n}{x}(x+y)^n$

$\Rightarrow 7x^2y^4 = \frac{n}{x}(x+y)^n$

$\Rightarrow 7\cancel{x^3y^4} = n\cancel{(x+y)^n}$

$\Rightarrow \boxed{n = 7}$

21) (i) $\frac{d}{dx}(x^a + a^x) = a \cdot x^{a-1} + a^x \cdot \log a.$

(ii) $\frac{d}{dx}(\cos x^\circ) = \frac{d}{dx}\left(\cos \frac{\pi x}{180}\right) = -\sin \frac{\pi x}{100} \times \frac{\pi}{180}.$

$= -\frac{\pi}{180} \sin x^\circ$

(iii) $\frac{d}{dx}(\log_a x) = \frac{d}{dx}(\log_e x \times \log_a e)$

$= \log_a e \times \frac{1}{x} = \frac{1}{x \log_e a}$

(iv) $3f(x) - 2f\left(\frac{1}{x}\right) = x \longrightarrow (1)$ (9)

$x \longleftrightarrow \frac{1}{x}$

$\Rightarrow 3f\left(\frac{1}{x}\right) - 2f(x) = \frac{1}{x} \longrightarrow (2)$

$(1)\times 3 \Rightarrow 9f(x) - 6f\left(\frac{1}{x}\right) = 3x \longrightarrow (3)$

$(2)\times 2 \Rightarrow 6f\left(\frac{1}{x}\right) - 4f(x) = \frac{2}{x} \longrightarrow (4)$

$(3)+(4) \Rightarrow 5f(x) = 3x + \frac{2}{x}$

$\Rightarrow 5f'(x) = 3 - \frac{2}{x^2}$

$\therefore f'(2) = \frac{1}{2}$

~~Am~~ t, p, r, s

22 (i) $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = 6$

$\Rightarrow$ S.O.B.S

$\frac{x}{y} + \frac{y}{x} + 2 = 6$

$\Rightarrow \frac{x}{y} + \frac{y}{x} = 4$

$\Rightarrow \frac{y\cdot 1 - x\cdot\frac{dy}{dx}}{y^2} + \frac{x\cdot\frac{dy}{dx} - y\cdot 1}{x^2} = 0$

$\Rightarrow \frac{dy}{dx} = \frac{y}{x}$

(ii) $y = \tan^{-1}\left(\cot\left(\frac{\pi}{2} - x\right)\right)$

$y = \tan^{-1}(\tan x)$

$y = x$

$\therefore \frac{dy}{dx} = 1.$

(iii) $y = \tan^{-1}(\sec x + \tan x)$

$$y = \tan^{-1}\left(\frac{1+\sin x}{\cos x}\right)$$

$$y = \tan^{-1}\left(\frac{\left(\cos\frac{x}{2} + \sin\frac{x}{2}\right)^2}{\cos^2\frac{x}{2} - \sin^2\frac{x}{2}}\right)$$

$$= \tan^{-1}\left(\frac{\cos\frac{x}{2} + \sin\frac{x}{2}}{\cos\frac{x}{2} - \sin\frac{x}{2}}\right)$$

$$= \tan^{-1}\left(\frac{1+\tan\frac{x}{2}}{1-\tan\frac{x}{2}}\right)$$

$$= \tan^{-1}\left(\tan\left(\frac{\pi}{4} + \frac{x}{2}\right)\right)$$

$$\therefore y = \frac{\pi}{4} + \frac{x}{2}$$

$$\therefore \frac{dy}{dx} = \frac{1}{2}$$

(iv) $y = (\log x)^3$

$$\frac{dy}{dx} = 3(\log x)^2 \cdot \frac{1}{x}$$

Ans: s, p, t, q

LEARNER'S TASK

CUQ'S

01. Conceptual — Ans: B

02. Conceptual — Ans: C

03. Conceptual — Ans: D

04. Conceptual — Ans: D

05. Conceptual — Ans: D

06. Conceptual — Ans: C

07. Conceptual. — Ans: D

08. Conceptual. — Ans: D

09. Conceptual. — Ans: C

10. Conceptual — Ans: D

JEE MAINS LEVEL

01. $\frac{d}{dx}\left(\frac{5x-3}{2x+7}\right) = \frac{ad-bc}{(cx+d)^2} = \frac{5\cdot 7-(-3)\cdot 2}{(2x+7)^2}$

$= \frac{41}{(2x+7)^2}$ Ans: C

02. $y = 10^{-x}$

$\Rightarrow \frac{dy}{dx} = 10^{-x}\cdot \log 10\,(-1) = 10^{-x}\log\left(\frac{1}{10}\right)$ Ans: B

03. $x\sqrt{1+y} + y\sqrt{1+x} = 0$

$\Rightarrow \cancel{x\cdot\frac{1}{2\sqrt{1+y}}\left(\frac{dy}{dx}\right) + \sqrt{1+y}} +$ ~~S.O.B.S~~

$\Rightarrow x\sqrt{1+y} = -y\sqrt{1+x}$

S.O.B.S

$\Rightarrow x^2(1+y) = y^2(1+x)$

$\Rightarrow x^2 + x^2y = y^2 + xy^2$

$\Rightarrow x^2 - y^2 = xy^2 - x^2y$

$\Rightarrow (x+y)(x-y) = xy(y-x)$

$\Rightarrow x+y+xy = 0$

$\Rightarrow (1+x)y = -x$

$\Rightarrow y = \dfrac{-x}{1+x}$

$\Rightarrow \dfrac{dy}{dx} = \dfrac{-1}{(1+x)^2}$ Ans : B

04. $\dfrac{d}{dx}(\cos\sqrt{x}) = -\sin\sqrt{x} \cdot \dfrac{1}{2\sqrt{x}}$ Ans. D

05. $\dfrac{d}{dx}(\cos 3x) = -\sin 3x \cdot 3$ Ans: C

06. $f(x) = \dfrac{x}{1+x}$

$f(f(x)) = f\left(\dfrac{x}{1+x}\right) = \dfrac{\left(\dfrac{x}{1+x}\right)}{1+\left(\dfrac{x}{1+x}\right)} = \dfrac{x}{1+2x}$

$\therefore g(x) = \dfrac{x}{1+2x}$

$g'(x) = \dfrac{(1+2x)\cdot 1 - x\cdot(2)}{(1+2x)^2} = \dfrac{1}{(1+2x)^2}$

Ans. D

07. $\dfrac{d}{dx}(ax^2+bx+c) = 2ax+b$ Ans. C

08. $\dfrac{d}{dx}\left[\log\left(\cos(x^3)\right)\right] = \dfrac{1}{\cos(x^3)} \cdot (-\sin(x^3)) \cdot 3x^2$

Ans. B

09. $\frac{d}{dx}\left(\frac{1}{\sqrt{x}} + \sqrt{x} + 2x\right)$

$= -\frac{1}{2x\sqrt{x}} + \frac{1}{2\sqrt{x}} + 2$

Ans: A

10. $\frac{d}{dx}\left(\log x + \frac{1}{x} + \frac{1}{x^2}\right)$

$= \frac{1}{x} - \frac{1}{x^2} - \frac{2}{x^3}$

Ans: D

11. $f(x) = (x^2-3)(4x^3+1)$

$f(x) = 4x^5 + x^2 - 12x^3 - 3$

$f'(x) = 20x^4 + 2x - 36x^2$

$= 20x^4 - 36x^2 + 2x$

$ax^4 + bx^2 + cx$

$\therefore a = 20, \quad b = -36, \quad c = 2$

$\therefore a+b+c = -14$

Ans: A, B, C, D

12. $f(x) = e^x + \sin x \cdot \cos x$

$f(x) = e^x + \frac{1}{2} \cdot \sin 2x$

$f'(x) = e^x + \frac{1}{2} \cdot \cos 2x \cdot 2$

$\therefore f'(x) = e^x + \cos 2x$

Ans: A, C

13. Statement I: $f(x) = xe^x \cdot \sin x$

$f'(x) = 1 \cdot e^x \sin x + x \cdot e^x \cdot \sin x + xe^x \cos x$

$= e^x(x \sin x + x \cos x + \sin x)$ (True)

Statement II: (True)

Ans. A

14. Statement I: $y = \cos(\log x + e^x)$

$$\frac{dy}{dx} = -\sin(\log x + e^x)\cdot\left(\frac{1}{x} + e^x\right) \quad \text{(True)}$$

Statement II: Conceptual (True) Ans. A

15. $$f(x) = \frac{2\sin x + 3}{4\sin x - 3}$$

$$f'(x) = \frac{2\cdot(-3) - (3)\cdot 4}{(4\sin x - 3)^2} \times \frac{d}{dx}(\sin x)$$

$$\frac{12}{6}$$

$$= \frac{-18\cos x}{(4\sin x - 3)^2}$$

Ans. B

16. $$f(x) = \frac{3e^x - 2}{6e^x - 4}$$

$$f'(x) = \frac{3(-4) - (-2)\cdot 6}{(6e^x - 4)^2} \frac{d}{dx}(e^x)$$

$$= 0$$

Ans: D

17. $f(x) = 2x^2 + 3x - 5$

$f'(x) = 4x + 3$

Now, $f'(0) + 3f'(-1)$

$$= [4(0) + 3] + 3[4(-1) + 3]$$

$$= 3 - 12 + 9 = 0$$

Ans: D

18 $f(x) = 1 + x + x^2 + \cdots + x^{100}$ 15

$f'(x) = 1 + 2x + 3x^2 + \cdots + 100x^{99}$

$f'(1) = 1 + 2 + 3 + \cdots + 100$

$= \frac{100(100+1)}{2}$ $S_n = \frac{n(n+1)}{2}$

$= 5050$ Ans. D

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19 $f(x) = e^x(x^2+1)$

$f'(x) = e^x(2x) + (x^2+1) \cdot e^x$

$f'(0) = e^0(2 \cdot 0) + (0^2+1) \cdot e^0$

$= 1$ Ans: 1

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20 $f(x) = \frac{\cos x}{\sin x + \cos x}$

$f'(x) = \frac{(\sin x + \cos x)(-\sin x) - \cos x(\cos x - \sin x)}{(\sin x + \cos x)^2}$

$f'(0) = \frac{(\sin 0 + \cos 0)(-\sin 0) - \cos 0(\cos 0 - \sin 0)}{(\sin 0 + \cos 0)^2}$

$= \frac{-1}{1} = -1$ Ans: -1

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21 (i) $\frac{d}{dx}\left(\frac{3x+1}{6x-1}\right) = \frac{3(-1) - (1)(6)}{(6x-1)^2} = \frac{-9}{(6x-1)^2}$

(ii)

(ii) $y = (1+x^{\frac{1}{4}})(1+x^{\frac{1}{2}})(1-x^{\frac{1}{4}})$

$y = \left[(1)^2 - (x^{\frac{1}{4}})^2\right]\left[1+x^{\frac{1}{2}}\right]$

$= (1-x^{\frac{1}{2}})(1+x^{\frac{1}{2}})$

$y = 1-x$

$\therefore \frac{dy}{dx} = -1$

(iii) $y = 10^{-x}$

$\frac{dy}{dx} = 10^{-x} \cdot \log 10 \ (-1)$

$= 10^{-x} \log\left(\frac{1}{10}\right)$

(iv) $y = \sin^{-1}(x^2)$

$\frac{dy}{dx} = \frac{1}{\sqrt{1-(x^2)^2}} \cdot \frac{d}{dx}(x^2) = \frac{2x}{\sqrt{1-x^4}}$

~~Ans~~: t, p, q, r

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22 (i) $e^x + e^y = e^{x+y}$

$\Rightarrow e^x + e^y \cdot \frac{dy}{dx} = e^{x+y}\left(1+\frac{dy}{dx}\right)$

$\Rightarrow e^x + e^y \frac{dy}{dx} = e^{x+y} + e^{x+y}\frac{dy}{dx}$

$\Rightarrow (e^y - e^{x+y})\frac{dy}{dx} = e^{x+y} - e^x$

$\Rightarrow e^y(1-e^x)\frac{dy}{dx} = e^x(e^y - 1)$

$$\frac{dy}{dx} = \frac{e^x(e^y-1)}{e^y(1-e^x)}$$

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

$$= \frac{e^x+e^y-e^x}{e^y-e^x-e^y} = \frac{e^y}{-e^x}$$

$$= -e^{y-x}$$

(ii) $2^x + 2^y = 2^{x+y}$

$\Rightarrow 2^x.\log 2 + 2^y.\log 2 \frac{dy}{dx} = 2^{x+y}.\log 2\left(1+\frac{dy}{dx}\right)$

when $x = y = 1$ $\quad 2 + 2\frac{dy}{dx} = 4\left(1+\frac{dy}{dx}\right)$

$\Rightarrow$ $\cancel{1 + \frac{dy}{dx} =}$ $\Rightarrow \frac{dy}{dx} = -1$

(iii) $x\sqrt{1+y} + y\sqrt{1+x} = 0$

$\Rightarrow x\sqrt{1+y} = -y\sqrt{1+x}$

$\Rightarrow x^2(1+y) = y^2(1+x)$

$\Rightarrow x^2 + x^2y = y^2 + xy^2$

$\Rightarrow x^2 \cancel{+} - y^2 = xy^2 - x^2y$

$\Rightarrow (x^2-y^2) = xy(y-x)$

$\Rightarrow (x+y)(x-y) = xy(y-x)$

$\Rightarrow x+y+xy = 0$

$\Rightarrow x + (1+x)y = 0$

$\Rightarrow y = \frac{x}{x+1}$

$\frac{dy}{dx} = \frac{-1}{(1+x)^2}$

(18)

(iv) $y = x\sin(a+y)$

$$\Rightarrow x = \frac{y}{\sin(a+y)}$$

$$\Rightarrow 1 = \frac{\sin(a+y)\cdot\frac{dy}{dx} - y\cdot\cos(a+y)\frac{dy}{dx}}{\sin^2(a+y)}$$

$$\Rightarrow 1 = \frac{[\sin(a+y) - y\cos(a+y)]\frac{dy}{dx}}{\sin^2(a+y)}$$

$$\therefore \frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin(a+y) - y\cos(a+y)}$$

Ans: P, q, s, –

$\Longrightarrow$ THE END $\Longleftarrow$.