

$$\frac{dy}{dx} = \log x \cdot \frac{d(a^{\sin x})}{dx} + a^{\sin x} \cdot \frac{d(\log x)}{dx}$$

$$= \log x \cdot [a^{\sin x} \cdot \cos x + \sin x \cdot a^{\sin x} \cdot \log a] - a^{\sin x} \cdot \frac{1}{x}$$

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

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Q20 Diff. $\sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}}$ w.r.t. x

$$\rightarrow y = \sqrt{3x+2} + \frac{1}{\sqrt{2x^2+4}} \Rightarrow \sqrt{3x+2} + (2x^2+4)^{-1/2}$$

$$\frac{dy}{dx} = \frac{diff. w.r.t. x}{2\sqrt{3x+2}} \times 3 + \left[\frac{1}{2} (2x^2+4)^{-1/2-1} \cdot \frac{dx}{2} \right]$$

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$$= \frac{3}{2\sqrt{3x+2}} - \frac{2x}{(2x^2+4)^{3/2}}$$

Q21 Diff. $e^{\sec^2 x} + 3 \cos^{-1} x$ w.r.t. x

$$\rightarrow y = e^{\sec^2 x} + 3 \cos^{-1} x$$

$$\frac{dy}{dx} = e^{\sec^2 x} \cdot \frac{diff. w.r.t. x}{2} \cdot \sec^2 x \cdot \tan x + 3 \cdot \frac{-1}{\sqrt{1-x^2}}$$

$$= \frac{2 e^{\sec^2 x} \cdot \sec^2 x \cdot \tan x - 3}{\sqrt{1-x^2}}$$

Q22 Diff. $\cos^{-1}(\sin x)$ w.r.t. x

$$y = 2 \tan^{-1}(2x) \quad \text{diff w.r.t } x$$

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

$$= \frac{2^{2+1} \log 2}{1+4x^2}$$

Q25 Diff $\sin^{-1}(x\sqrt{x})$ w.r.t. x

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

diff w.r.t. x

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-(x\sqrt{x})^2}} \cdot \left[\frac{3}{2} x^{\frac{3}{2}-1} \right]$$

$\leftarrow 1 \cdot x^{\frac{1}{2}} = x^{\frac{3}{2}}$
u.v rule also can be applied

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

Q26 Diff $\frac{\cos^{-1} x}{\sqrt{2x+7}}$ w.r.t. x

→

$$y = \frac{\cos^{-1}(x/2)}{\sqrt{2x+7}}$$

diff. w.r.t. x

$$\frac{dy}{dx} = \frac{\frac{1}{\sqrt{2x+7}} \left[\frac{1}{\sqrt{1-(x/2)^2}} \cdot \left(-\frac{1}{2}\right) \right] - \cos^{-1}(x/2) \cdot \frac{1}{(\sqrt{2x+7})^2}}{(\sqrt{2x+7})^2}$$

$$= \frac{-\frac{1}{2\sqrt{1-x^2/4}} - \frac{\cos^{-1}(x/2)}{\sqrt{2x+7}}}{2\sqrt{2x+7}}$$

$$= \frac{-\frac{1}{2\sqrt{1-x^2/4}} - \frac{\cos^{-1}(x/2)}{\sqrt{2x+7}}}{2\sqrt{2x+7}}$$

Q27

Diff

$\cot^{-1}$

$$\left[\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}} \right]$$

w.r.t. x