

Set-02

① $y = \log \sqrt{\frac{1+\tan x}{1-\tan x}}$ Prove that $\frac{dy}{dx} = \sec 2x$

② Prove that $\frac{d}{dx} \left\{ \frac{x}{2} \sqrt{a^2 x^2 + a^2} \sin^{-1} \frac{x}{a} \right\} = \sqrt{a^2 - x^2}$

③ If $y = e^{2x} \cos x$ Prove that $\frac{dy}{dx} = \sqrt{2} e^{2x} \cos(x + \frac{\pi}{4})$

④ $y = \tan^{-1} \sqrt{\frac{1-\sin x}{1+\sin x}}$, $-\pi < x < \pi$ find y' = ?

⑤ $y = \tan^{-1} (\sec x + \tan x)$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$ find y' = ?

⑥ $y = \tan^{-1} \left\{ \frac{\sqrt{1+x^2} - 1}{x} \right\}$, $x \neq 0$ find y' = ?

⑦ $y = \tan^{-1} \left\{ \frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}} \right\}$, $0 < x < \pi$ find y' = ?

⑧ $y = \tan^{-1} \left\{ \frac{a \cos x - b \sin x}{b \cos x + a \sin x} \right\}$, $-\frac{\pi}{2} < x < \frac{\pi}{2}$ find y' = ?

⑨ $y = \tan^{-1} \left\{ \frac{3a^2 x - x^3}{a^3 - 3ax^2} \right\}$, $\frac{1}{\sqrt{3}} < \frac{x}{a} < \frac{1}{\sqrt{3}}$ find y' = ?

⑩ $y = \cos^{-1} \left\{ x \sqrt{1-x} + \sqrt{x} \sqrt{1-x^2} \right\}$ and $0 < x < 1$ find $\frac{dy}{dx}$ = ?

⑪ $y = \tan^{-1} \left\{ \frac{\sqrt{1+x^2} + \sqrt{1-x^2}}{\sqrt{1+x^2} - \sqrt{1-x^2}} \right\}$, $-1 < x < 1$ find $\frac{dy}{dx}$ = ?

⑫ Differentiate $y = \sin^{-1} \left\{ \frac{2^{x+1} - 3^x}{1+(36)^x} \right\}$