Derivatives of Logarithmic Functions

- Differentiate $y = \ln(e^{-x} + xe^{-x})$.

- Differentiate and find the domain of $f(x) = \frac{x}{1-\ln(x-1)}$.

- Differentiate and find the domain of $f(x) = \sqrt{2 + \ln x}$.

- Find y' if $x^y = y^x$.

- Evaluate the integral $\displaystyle\int \frac{(\ln x)^2}{x}\, dx$.

Inverse Trigonometric Functions

- Prove that $\cos(\sin^{-1} x) = \sqrt{1 - x^2}$

- Find the derivative of $y = \sin^{-1}(2x + 1)$.

- Find the derivative of $y = \cos^{-1}(e^{2x})$.

- Find the derivative of $y = \arctan(\cos\theta)$

- Find the derivative of $g(x) = \cos^{-1}(3 - 2x)$. What are the domains of the function and its derivatives?

- Find y' if $\tan^{-1}(x^2 y) = x + xy^2$.

- Find the limit: $\lim\limits_{x \to \infty} \arctan(e^x)$.

- Evaluate the integral $\displaystyle\int \frac{dx}{\sqrt{1 - x^2}\sin^{-1} x}$

- Evaluate the integral $\displaystyle\int \frac{t^2}{\sqrt{1 - t^6}}\, dt$

Hyperbolic Functions

- Find the derivative of $f(x) = \tanh(1 + e^{2x})$.

- Find the derivative of $y = e^{\cosh 3x}$.

- Find the derivative of $y = \sinh(\cosh x)$.

- Evaluate the integral $\displaystyle\int \sinh(1 + 4x)\ dx$.

- Evaluate the integral $\displaystyle\int \frac{\sinh \sqrt{x}}{\sqrt{x}}\ dx$.