

Find the Derivate of the following:

1.  $y = x^5 - e^{3x^2} \ln(x)$

2.  $f(x) = \frac{x}{1 - e^x}$

3.  $y = \frac{1 + 5x}{\ln(x)}$

4.  $y = \ln|\csc x| + (\ln(x))^2$

5.  $y = \ln \sqrt[5]{\frac{x-1}{2-e^x}}$

6.  $y = \ln \sqrt[3]{1 - \cos x^2}$

7. Given :  $y = 2 \ln(x) + e^{-x}$

Find :  $xy'' + y'$

Find the Integral of the following:

8.  $\int \frac{x^3 - 6x - 20}{x + 5} dx$

9.  $\int \frac{1}{x \ln(x^3)} dx$

10.  $\int \frac{(1 + \ln x)^2}{x} dx$

11.  $\int -\tan 3x dx$

12.  $\int \frac{x+1}{x} dx$

13.  $\int \frac{2x-1}{x+1} dx$

14. Find the inverse function of  $f(x) = \sqrt[3]{\frac{x+1}{3}} - 5$

15. Find  $f^{-1}(a)$  given  $f(x) = \frac{1}{27}(x^5 + 2x^3)$  for  $a = -11$ .