Faculty of Science
Department of Mathematics and Statistics

Math 251/249

Worksheet 12
[Logarithmic and Exponential functions]

A.   In each case determine y'.

1. $y = \ln\left(\dfrac{x^3}{1 + x^2}\right)$

2. $y = \ln\left(\ln\left(x \tan x\right)\right), \quad 0 < x < \dfrac{\pi}{2}$

3. $y = \ln\left(\cos^2 x \sqrt{1 + x^4}\right)$

4. $y = \log_2\left(x^3 + x^2 + 1\right)$

5. $y = e^{\left(5x^2 + 3\right)}$

6. $y = e^{\sec^2 x}$

7. $y = \ln\left(\ln\left(\ln x\right)\right)$

8. $y = \left(x^3 - 4x\right)^{\ln x}$

9. $y = x^{x^2}$

10. $y = x^{x \sin x}$

11. $y = e^{x^2}\left(x^2 + 1\right)^{10}\sqrt{x}$

12. $y = \left(\ln x\right)^{\sin x}$

13. $y = \left(x + \sqrt{x}\right)^{-\frac{1}{3}}$

14. $y = 10^{\tan(\pi x)}$

15. $y = \ln\left|\sec x - \tan x\right|$

16. $y = e^{\left(\csc^2 x - \cot^2 x\right)}$

17. $y = x^2 \ln x$

18. $y = \dfrac{\sin^2 x \tan^4 x}{\left(x^3 + x^2 + 1\right)^3}$

19. $y = \left(\ln x\right)^{\cos x}$

20. $y = x^{\left(\frac{1}{x}\right)}$

21. $x = \ln \sec y$

22. $y = \ln\left(\dfrac{e^x + 1}{e^x - 1}\right)$

23. $y = \ln\left(x + \sqrt{x^2 + 1}\right)$

24. $y = \ln\left(x + \sqrt{x^2 - 1}\right)$

25. $y = \log_x\left(x^2 + 1\right)$