2.8 Derivatives of Exponential and Logarithmic Functions

Simplify:

1. $\frac{e^{x}}{\sqrt{e^{x}}}$ ($\sqrt{e^{x}}$)

2. $e^{3\ln x}$ (x^{3})

3. $\ln\frac{1}{e^{3x}}$ ($-3x$)

4. $3\ln 4 - 2\ln 3$ ($\ln\left(\frac{64}{9}\right)$)

5. $2\ln x + 3\ln(x-2)$ ($\ln x^{2}(x-2)^{3}$)

Solve the following equations for x

6. $2^{x+1} = 3^{x}$ ($x = \frac{\ln 2}{\ln\left(\frac{3}{2}\right)}$)

7. $\frac{1}{2^{x}} = \frac{3}{8^{x+1}}$ ($x = \frac{\ln 3 - 3\ln 2}{2\ln 2}$)

Find domain of the following functions :

8. $\ln\left(\frac{x}{2-x}\right)$ ($0 < x < 2$)

Differentiate the following functions and simplify if it is possible:

9. $y = e^{x^{5}}$ ($5x^{4}e^{x^{5}}$)

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

11. $y = \ln(7x-2)$ ($\frac{7}{7x-2}$)

12. $y = \ln(1+e^{x})$ ($\frac{e^{x}}{1+e^{x}}$)

13. $y = \frac{e^{x}+e^{-x}}{2}$ ($\frac{e^{x}-e^{-x}}{2}$)

14. $y = e^{e^{x}}$ ($e^{x+e^{x}}$)

15. $y = e^{x}\sin x$ ($e^{x}(\sin x + \cos x)$)

16. $y = \ln(\ln x)$ ($\frac{1}{x\ln x}$)

17. $y = x^{2}\ln x - \frac{x^{2}}{2}$ ($2x\ln x$)

18. $y = 5^{2x+1}$ ($2\ln 5 \cdot 5^{2x+1}$)