Math 220 - Calculus f. Business and Management - Worksheet 16

Worksheet 16 - Exponents, Logs and the Chain Rule

Find the derivative of each function

Hint: Some functions are much easier to differentiate if you use your knowledge of lessons 5 and 6 on exponents of logs to write them differently. Examples are A3 and D3.

Exercise 1:

$$\textbf{1a}: f(x) = 5^x\,, \qquad \textbf{1b}: \; f(x) = \log_3 x\,, \qquad \textbf{1c}: \; f(x) = \ln(x^2)\,, \qquad \textbf{1d}: \; f(x) = \log x\,.$$

Exercise 2:

$$\textbf{2a}: f(x) = 7^x\,(x^2+2x-5)\,, \qquad \textbf{2b}: \; f(x) = (4x+2)\,\log_3 x\,, \qquad \textbf{2c}: \; f(x) = (1/x^4)\,\ln x\,.$$

Exercise 3:

$$\textbf{3a}: f(x) = \frac{\log_3 x}{5x^3+2x+10}, \qquad \textbf{3b}: \; f(x) = \frac{x^3+4x-7}{6^x}, \qquad \textbf{3c}: \; f(x) = \frac{x+\ln x}{2^x}.$$

Exercise 4:

$$\textbf{4a}: f(x) = 6^{3x^5-5x^3+7}\,, \qquad \textbf{4b}: \; f(x) = \ln(x^2)\,,$$
$$\textbf{4c}: f(x) = (\log_4 x)^3\,, \qquad \textbf{4d}: \; f(x) = \ln(x^4-3x^2+2x)\,.$$

Note that 4b is the same as 1c above. This time use the chain rule.

Exercise 5:

$$\textbf{5a}: f(x) = \log_3\sqrt{x}\,, \qquad \textbf{5b}: \; f(x) = 4^{1/x}\,, \qquad \textbf{5c}: \; f(x) = \log_5 e^{4x^2}\,.$$