1. Use properties of logarithms to expand each expression. Simplify where possible.

a) $\log_9(9x)$

b) $\log\left(\frac{x}{1000}\right)$

c) $\log_b x^7$

d) $\log_8\left(\frac{64}{\sqrt{x+1}}\right)$

e) $\log_b\left(\frac{\sqrt[3]{x}y^4}{z^5}\right)$

2. Write each expression as a single logarithm. Simplify where possible.

a) $\log 250 + \log 4$

b) $\log_3 405 - \log_3 5$

c) $\log x + 7\log y$

d) $8\ln(x+9) - 4\ln x$

3. Use the Change-of-Base Theorem to rewrite $\log_4 23$ in terms of natural logarithms. Then use a calculator to evaluate to four decimals places.

Q: What do you get when you expand $(x - a)(x - b)(x - c)\ldots(x - y)(x - z)$?