Worksheet -- Section 5.3 -- Properties of Logarithms

1. a) Find the change-of-base formula in the book and write it here:

   b) Use the formula to convert $\log_4(5)$ to base 10:       Evaluate the expression:

   c) Use the formula to convert $\log_4(5)$ to base $e$:       Evaluate the expression:

2. **Expand** the following expressions so that the input to each logarithm is a single letter or number:

   a) $\log(6\,x)$

   b) $\log(x^2)$

   c) $\log(6\,x^2)$

   d) $\log(6\,x^2\,y)$

   e) $\log\left(\frac{x}{y}\right)$

   f) $\log\left(\frac{x}{y^2}\right)$

   g) $\log\left(\sqrt{x}\right)$

   h) $\log\left(\sqrt{x\,y}\right)$

3. **Condense** the following expressions to a single logarithm:

   a) $\log(x) + \log(5)$

   b) $\log(x) + \log(x) + \log(x)$

   c) $\log(5) + 2\log(x)$

   d) $\log(7) - \log\left(\frac{1}{x^2}\right) + \log(y)$

   e) $\frac{\log(x)}{2}$

   f) $\log(x) - \log(y^2)$

4. Find the exact value **without** your calculator:

   a) $\log_4(16^{1.6})$

   b) $\log_5(150) - \log_5(6)$

   c) $\ln(e^4) - \log_e(e^2)$

   d) $\log(1)$