1. Use the change of base formula to evaluate the following logarithm. Round your answer to the nearest hundredth.

$$\log_{19} 11$$

A. 0.58

B. -0.17

C. 1.35

D. 1

E. 0.81

F. 0.46

G. 1.66

H. 0.69

2. Match the expression with an equal expression from choices A through F.

$$\frac{\log x}{\log y}$$

A. $x \log y$

B. $y \log x$

C. $\log x + \log y$

D. x

E. $\log x - \log y$

F. This expression cannot be simplified.

3. Use the properties of logarithms to express the logarithm in terms of logarithms of simpler expressions. Each logarithmic term should have only one variable, and no exponents or radicals. Assume that the argument of each logarithm is a positive real number.

$$\ln((3r - 12)(10r - 6))$$

A. $\frac{\ln(3r) - \ln(12)}{\ln(10r) - \ln(6)}$

B. $\ln(3r - 12) - \ln(10r - 6)$

C. $\ln(3r - 12) \cdot \ln(10r - 6)$

D. $\ln(3) \cdot \ln(r) \cdot \ln(12) \cdot \ln(10r) \cdot \ln(6)$

E. $\ln(3r) - \ln(12) + \ln(10r) - \ln(6)$

F. $(\ln(3r) - \ln(12)) \cdot (\ln(10r) - \ln(6))$

G. $\frac{\ln(3r - 12)}{\ln(10r - 6)}$

H. $\ln(3r - 12) + \ln(10r - 6)$

4. Combine the logarithmic terms into a single logarithmic expression with a coefficient of 1. Assume that the argument of each logarithm is a positive real number.

$$\frac{1}{5}\log(j)$$

A. $\log(\frac{1}{5} - j)$

B. $\log(-\frac{1}{5}j)$

C. $\log(-\frac{1}{5})^j$

D. $\log(\frac{1}{5} + j)$

E. $\log(j^{-\frac{1}{5}})$

F. $\log(\frac{1}{5}j)$

G. $\log(\sqrt[5]{j})$

H. $\log(\frac{1}{5})^j$

5. Use the properties of logarithms to express the logarithm in terms of logarithms of simpler expressions. Each logarithmic term should have only one variable, and no exponents or radicals. Assume that the argument of each logarithm is a positive real number.

$$\ln(\rho^2)$$

A. $\rho \ln 2$

B. $2 \ln \rho$

C. $\frac{1}{2} \ln \rho$

D. $\ln(2\rho)$

E. $2 - \ln \rho$

F. $\frac{2}{\ln \rho}$

G. $(\ln \rho)^2$

H. $2 + \ln \rho$

6. Use the properties of logarithms to express the logarithm in terms of logarithms of simpler expressions. Each logarithmic term should have only one variable, and no exponents or radicals. Assume that the argument of each logarithm is a positive real number.

$$\log(r^3\omega^{-3}\eta^2)$$

A. $\log(r^3) \cdot \log(\omega^{-3}) \cdot \log(\eta^2)$

B. $3\log(r) - 3\log(\omega) + 2\log(\eta)$

C. $\log(-18r\omega\eta)$

D. $\log(r^3) + \log(\omega^{-3}) + \log(\eta^2)$

E. $\log(r)^3 + \log(\omega)^{-3} + \log(\eta)^2$

F. $\log(r)^3 \cdot \log(\omega)^{-3} \cdot \log(\eta)^2$

G. $((\log(r) \cdot \log(\omega) \cdot \log(\eta))^{-18}$

H. $-18\log(r) \cdot \log(\omega) \cdot \log(\eta)$

7. Combine the logarithmic terms into a single logarithmic expression with a coefficient of 1. Assume that the argument of each logarithm is a positive real number.

$$7\ln(\xi)$$

A. $\ln(-7^{\xi})$

B. $\ln(\xi^{7})$

C. $\ln(7^{\xi})$

D. $\ln(-7\xi)$

E. $\ln(\xi^{-7})$

F. $\ln(7\xi)$

G. $\ln\left(-\frac{\xi}{7}\right)$

H. $\ln\left(\frac{\xi}{7}\right)$

8. Match the expression with an equal expression from choices A through F.

$$\log(x-y)$$

A. $y\log x$

B. x

C. $x\log y$

D. $\log x - \log y$

E. $\log x + \log y$

F. This expression cannot be simplified.