Use a calculator to evaluate the logarithmic expression if it is defined and check your result by evaluating the corresponding exponential expression

a) log 34.5 =

b) log 0.43 =

c) log (-3) =

d) ln 23.5 =

e) ln 0.48 =

f) ln(-5) =

$3x = 27$

$x + 5 = 1$

Solve the equation

a) log x = 3

$10^3 = x$

$x = 1000$

b) $\log_2 x = 5$

$2^5 = x$

$x = 32$

Properties of Logarithms

Multiplication

$\log_b xy = \log_b x + \log_b y$

Division

$\log_b \frac{x}{y} = \log_b x - \log_b y$

Powers (Exponents)

$\log_b x^c = c\log_b x$

$\sqrt[3]{x^4} = \left(x^4\right)^{\frac{1}{3}}$

Assuming x and y are positive, use properties of logarithms to write the expression as a **sum or difference** of logarithms or multiples of logarithms

A) $\log(8x)$

$\log 8 + \log x$

B) $\ln\left(\frac{5}{x}\right)$

$\ln 5 - \ln x$

C) $\log_2\left(x^5\right) = 5\log_2 x$

D) $\log(8x^2y^4)$

$\log 8 + \log x^2 + \log y^4$

$\log 8 + 2\log x + 4\log y$

E) $\ln\left(\frac{\sqrt{x^2+5}}{\sqrt[3]{x^4}}\right) = \ln \frac{(x^2+5)^{1/2}}{x^{\frac{4}{3}}}$

$\ln (x^2+5)^{1/2} - \ln x^{\frac{4}{3}}$

$\frac{1}{2}\ln(x^2+5) - \frac{4}{3}\ln x$

Assuming x, y and z are positive, use properties of logarithms to write the expression as a **single** logarithm

A) $\log x+\log 6$

$\log 6x$

B) $\ln x-\ln 6$

$\ln \frac{x}{6}$

C) $\frac{1}{4}\log x$

$\log x^{\frac{1}{4}}$

$\log \sqrt[4]{x}$

D) $6\log x-\frac{1}{2}\log y$

$\log x^6 - \log y^{\frac{1}{2}}$

$\log \frac{x^6}{y^{1/2}} = \log \frac{x^6}{\sqrt{y}}$

E) $5\log(x^2y)+3\log(y^2z)$

$\log(x^2y)^5 + \log(y^2z)^3$

$\log (x^2y)^5(y^2z)^3$

$\log x^{10}y^5 \cdot y^6 z^3 \Rightarrow \log x^{10}y^{11}z^3$

F) $\ln x^5-2\ln(xy)$

$\ln x^5 - \ln (xy)^2$

$\ln \frac{x^5}{x^2y^2} = \ln \frac{x^3}{y^2}$