Review Exercise Set 16

Exercise 1: Use the properties of logarithms to expand and reduce the given logarithmic expression as much as possible.

$$\log_2\left(\frac{x^2}{6}\right)$$

Exercise 2: Use the properties of logarithms to expand and reduce the given logarithmic expression as much as possible.

$$\ln\left(\frac{\sqrt{x^2-x-12}}{\sqrt{2x^2-7x+3}}\right)$$

Exercise 3: Use the properties of logarithms to condense the given logarithmic expression as a single logarithm whose coefficient is 1.

3ln (x) + 2ln (y) - ln (z)

Exercise 4: Use the properties of logarithms to condense the given logarithmic expression as a single logarithm whose coefficient is 1.

$$\frac{1}{3}\log(x^2+2) - \frac{1}{2}\log(x-3) - \log(x+1) + 1$$

Exercise 5: Letting log 2 = A, log 3 = B, and log 5 = C, write the given expression in terms of A, B and C.

$$\log\frac{25}{18}$$

Review Exercise Set 16 Answer Key

Exercise 1: Use the properties of logarithms to expand and reduce the given logarithmic expression as much as possible.

$$\log_2\left(\frac{x^2}{6}\right)$$

$= \log_2 x^2 - \log_2 6$
$= 2\log_2 x - \log_2 (2)(3)$
$= 2\log_2 x - [\log_2 2 + \log_2 3]$
$= 2\log_2 x - \log_2 2 - \log_2 3$
$= 2\log_2 x - 1 - \log_2 3$

Exercise 2: Use the properties of logarithms to expand and reduce the given logarithmic expression as much as possible.

$$\ln\left(\frac{\sqrt{x^2-x-12}}{\sqrt[3]{2x^2-7x+3}}\right)$$

$= \ln\sqrt{x^2-x-12} - \ln\sqrt[3]{2x^2-7x+3}$
$= \ln (x^2 - x - 12)^{1/2} - \ln (2x^2 - 7x + 3)^{1/3}$
$= \frac{1}{2}\ln (x^2 - x - 12) - \frac{1}{3}\ln (2x^2 - 7x + 3)$
$= \frac{1}{2}\ln [(x - 4)(x + 3)] - \frac{1}{3}\ln [(2x - 1)(x - 3)]$
$= \frac{1}{2}\ln (x - 4) + \frac{1}{2}\ln (x + 3) - \frac{1}{3}\ln (2x - 1) - \frac{1}{3}\ln (x - 3)$

Exercise 3: Use the properties of logarithms to condense the given logarithmic expression as a single logarithm whose coefficient is 1.

$3\ln (x) + 2\ln (y) - \ln (z)$

$= \ln (x)^3 + \ln (y)^2 - \ln (z)$
$= \ln (x^3)(y^2) - \ln (z)$
$= \ln \frac{x^3y^2}{z}$

Exercise 4: Use the properties of logarithms to condense the given logarithmic expression as a single logarithm whose coefficient is 1.

$\frac{1}{3}$ log $(x^2 + 2)$ - $\frac{1}{2}$ log (x - 3) - log (x + 1) + 1

$= \log(x^2+2)^{1/3} - \log(x-3)^{1/2} - \log(x+1) + 1$

$= \log\sqrt[3]{x^2+2} - \log\sqrt{x-3} - \log(x+1) + \log(10)$

$= \log\sqrt[3]{x^2+2} + \log(10) - \log\sqrt{x-3} - \log(x+1)$

$= \log\sqrt[3]{x^2+2} + \log(10) - \left[\log\sqrt{x-3} + \log(x+1)\right]$

$= \log\left(10\sqrt[3]{x^2+2}\right) - \log\left[(x+1)\sqrt{x-3}\right]$

$= \log\dfrac{10\sqrt[3]{x^2+2}}{(x+1)\sqrt{x-3}}$

Exercise 5: Letting log 2 = A, log 3 = B, and log 5 = C, write the given expression in terms of A, B and C.

log $\frac{25}{18}$

= log 25 - log 18
= log 5^2 - log (9)(2)
= 2 log 5 - [log 9 + log 2]
= 2 log 5 - log 3^2 - log 2
= 2 log 5 - 2 log 3 - log 2
= 2C - 2B - A