SEC 5.3   LAWS   OF   LOGARITHMS

REVIEW :   LAWS OF   EXPONENTS

1) $x^m \cdot x^n = x^{m+n}$

2) $\dfrac{x^m}{x^n} = x^{m-n}$

3) $\left(x^m\right)^n = x^{m \cdot n}$

4) $\sqrt[n]{a^m} = a^{\frac{m}{n}}$ so $\sqrt{x+1} = (x+1)^{\frac{1}{2}}$

1. LAWS OF   LOGARITHMS

A) $\log_a MN = \log_a M + \log_a N$

B) $\log_a \dfrac{M}{N} = \log_a M - \log_a N$

C) $\log_a M^r = r \cdot \log_a M$

2. CHANGE OF   BASE :

$$\log_a X = \dfrac{\log X}{\log a}$$

HOMEWORK QUESTIONS :

1. $\log_5 \sqrt{125}$

$\log_5 125^{\frac{1}{2}}$

$\frac{1}{2} \cdot \log_5 \cancel{125} \, 5^3$

$\frac{1}{2} \cdot \log_5 5^3$

$\frac{1}{2} \cdot 3$

$\boxed{\frac{3}{2}}$

5. $\log_4 192 - \log_4 3$

$\log_4 \frac{192}{3}$

$\log_4 64$

$\log_4 4^3 \qquad = \boxed{3}$

13. $\log_2 \overset{M}{2}\overset{N}{x} \quad = \quad \log_2 2 + \log_2 x$

$\boxed{1 + \log_2 x}$

37. $\ln \left(\frac{x^3 \sqrt{\cancel{x-1}}^{(x-1)^{1/2}}}{3x+4} \right) = \boxed{3 \ln x + \frac{1}{2} \ln (x-1) \; - \ln (3x+4)}$

41. $\log_2 A + \log_2 B - 2 \log_2 C$

$\boxed{\log_2 \frac{AB}{C^2}}$