12.4 p. 780

logarithm rules

$\log_a(xy) = \log_a x + \log_a y$

$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$

$\log_a x^n = n \cdot \log_a x$

mistakes

$\log_a(xy) \neq \log_a x \cdot \log_a y$

$\log_a\left(\frac{x}{y}\right) \neq \frac{\log_a x}{\log_a y}$

$\log_a x^n \neq \log_a nx$

ex 8 $\log_8(9 \cdot 11) = \log_8 9 + \log_8 11$

$= \log_8 3^2 + \log_8 11$

$= 2\log_8 3 + \log_8 11$

ex 10 $\log_3 \frac{7}{5} = \log_3 7 - \log_3 5$

ex 12 $\log_5 7^4 = 4 \log_5 7$

ex $\log_2 xyz = \log_2 x + \log_2 y + \log_2 z$

ex $\log_5 \frac{3x}{y} = \log_5 3 + \log_5 x - \log_5 y$

ex $\log_7 \frac{2x}{3y} = \log_7 2 + \log_7 x - \log_7 3 - \log_7 y$

$\log_7 (2x \cdot 3^{-1} \cdot y^{-1})$

$\log_7 2 + \log_7 x + \log_7 3^{-1} + \log_7 y^{-1}$

ex 14 $\log_7 \frac{\sqrt[3]{13}}{pq^2} = \log_7 13^{\frac{1}{3}} - \log_7 p - \log_7 q^2$

$= \frac{1}{3}\log_7 13 - \log_7 p - 2\log_7 q$

$\log_7 q^2 = \log_7 (q \cdot q)$

$= \log_7 q + \log_7 q$

$= 2\log_7 q$

ex 16 $\log_6 \sqrt{\frac{pq}{7}} = \log_6 \left(\frac{pq}{7}\right)^{\frac{1}{2}} = \frac{1}{2}\log_6 \frac{pq}{7}$

$\frac{1}{2}\left[\log_6 p + \log_6 q - \log_6 7\right]$

or

$\frac{1}{2}\log_6 p + \frac{1}{2}\log_6 q - \frac{1}{2}\log_6 7$

ex 18 $\log_4 \dfrac{\sqrt[4]{z} \cdot \sqrt[5]{w}}{\$^2}$

$= \log_4 \dfrac{z^{\frac{1}{4}} \cdot w^{\frac{1}{5}}}{\$^2}$

$= \log_4 z^{\frac{1}{4}} + \log_4 w^{\frac{1}{5}} - \log_4 \$^2$

$= \frac{1}{4}\log_4 z + \frac{1}{5}\log_4 w - 2\log_4 \$$

ex 22 $\log_b w + \log_b z = \log_b (wz)$

ex 24 $\log_b x - \log_b y = \log_b \dfrac{x}{y}$

ex 26 $\left(\log_a p - \log_a q\right) + 2\log_a r$

$= \log_a \dfrac{p}{q} + \log_a r^2$

$= \log_a \dfrac{p}{q} r^2$ or $\log_a \dfrac{pr^2}{q}$

ex 28 $3\log_a 5 - \frac{1}{2}\log_a 9$

$\log_a 5^3 - \log_a 9^{\frac{1}{2}}$

$\log_a \frac{5^3}{\sqrt{9}}$

$\log_a \frac{125}{3}$

$9^{\frac{1}{2}} = \sqrt{9}$

$5^{\frac{1}{2}} = \sqrt{5}$

ex 30 $\log_{10}(x+4) + \log_{10}(x-4)$

$\log_{10}(x+4)(x-4)$

$\log_{10}(x^2-16)$

ex 32

$\frac{1}{3}\log_b x + \frac{2}{3}\log_b y - \frac{3}{4}\log_b s - \frac{2}{3}\log_b t$

$\log_b x^{\frac{1}{3}} + \log_b y^{\frac{2}{3}} - \log_b s^{3/4} - \log_b t^{2/3}$

$\log_b \sqrt[3]{x} + \log_b \sqrt[3]{y^2} - \log_b \sqrt[4]{s^3} - \log_b \sqrt[3]{t^2}$

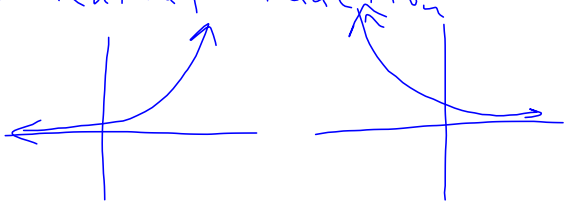
$\log_b \frac{\sqrt[3]{x}\sqrt[3]{y^2}}{\sqrt[4]{s^3}\sqrt[3]{t^2}}$ book → $\log_b \frac{x^{\frac{1}{3}} y^{\frac{2}{3}}}{s^{3/4} t^{2/3}}$

1-2 Is the function one to one?

{(,), (,), (,)}

3-5 Given a one to one function, you give the inverse.

6-7 Graph an exponential function



8-11 Solve an exponential equation

12-13 Change from exponential form to logarithmic form

14-15 Change from logarithmic form to exponential form.

16-18 solve a logarithmic equation for x

19-20 Use logarithm rules to rewrite expressions