chapter exercises [A]

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[1.1] 64 [1.2] $\frac{1}{4}$ [1.3] 2 [1.4] 128

[2.1] $(ab^2)^{\frac{2}{3}} \cdot a^{\frac{1}{2}} \div b^{1/3} = a^{\frac{2}{3}} b^{\frac{4}{3}} a^{\frac{1}{2}} b^{-1/3} = a^{7/6} b$

[2.2] $(x^{1/2} y^{-1/2})(x^{-1} y) = x^{-\frac{1}{2}} y^{1/2}$

[3.1] $x + \frac{1}{x} = \frac{x+1}{x}$

[3.2] $x^2 + \frac{1}{x^2} = \frac{x^4+1}{x^2}$

[4] $a^{1/2} = x$, $a^{2/3} = y$

$a = x^2$ so $y = (x^2)^{2/3} = x^{4/3}$

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[5.1] $\log_4 (\frac{1}{2}) = y \equiv 4^y = \frac{1}{2} \Rightarrow y = -\frac{1}{2}$

[5.2] $\log_2 \frac{1}{32} = y \equiv 2^y = \frac{1}{32} = 2^{-5} \Rightarrow y = -5$

[5.3] $\log_6 24 + \log_6 3 - \log_6 2$

$= \log_6 \left[\frac{3 \cdot 24}{2}\right] = \log_6 36 = 2$

[6] $m = \log_a x$, $n = \log_a y$

[6.1] $\log_a x^3 + \log_a \sqrt{y}$

$= 3 \log_a x + \frac{1}{2} \log_a y$

$= 3m + \frac{1}{2} n$

[6.2] $\log_a \sqrt{x} - \log_a y^2 = \frac{1}{2} \log_a x - 2 \log_a y = \frac{1}{2} m - 2n$

[6.3] $\log_a a^2 xy = \log_a a^2 + \log_a x + \log_a y = 2 + m + n$

[6.4] $\log_a xy^3 = \log_a x + 3 \log_a y = m + 3n$

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[7.1] $\log_x 8 = \frac{3}{2} \equiv 3\log_x 2 = \frac{3}{2} \equiv \log_x 2 = \frac{1}{2}$

$\Leftrightarrow x^{1/2} = 2 \Rightarrow x = 4$

[7.2] $\log_3 x = -3 \equiv 3^{-3} = x \equiv x = \frac{1}{3^3} \Rightarrow x = \frac{1}{27}$

[7.3] $\log_{10} x^2 = 4 \equiv 2\log_{10} x = 4 \equiv \log_{10} x = 2$

$\equiv 10^2 = x \Rightarrow x = 100$

[8.1] let $f(x) = a^x$

$LHS = f(x)f(y)$

$= a^x a^y$

$= a^{x+y}$

$= f(x+y)$

$= RHS$

[8.2]

$LHS = \frac{f(x)}{f(y)}$

$= \frac{a^x}{a^y}$

$= a^{x-y}$

$\equiv f(x-y)$

$= RHS$

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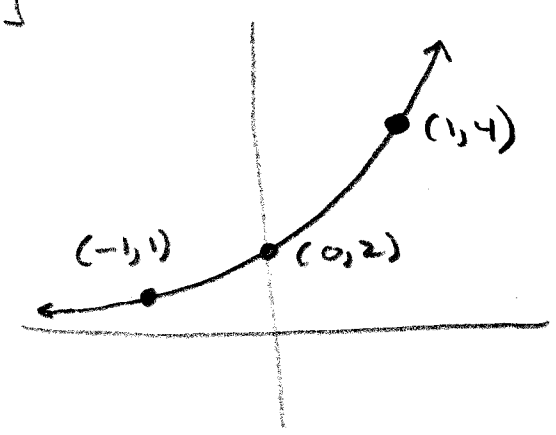
[9.1] Let $f(x) = \log_a x$

$$\begin{aligned} LHS &= f(xy) \\ &= \log_a xy \\ &= \log_a x + \log_a y \\ &= f(x) + f(y) \\ &= RHS \end{aligned}$$

[9.2] $$\begin{aligned} LHS &= f\left(\frac{x}{y}\right) \\ &= \log_a \frac{x}{y} \\ &= \log_a x - \log_a y \\ &= f(x) - f(y) \\ &= RHS \end{aligned}$$

[10.1]



[10.2] $y = \log_2 x - 1$