$\Leftrightarrow \quad 2\log\sqrt{ab} = \log a + \log b$

$\Leftrightarrow \quad \log(\sqrt{ab})^2 = \log(ab)$

$\Leftrightarrow \quad \log(ab) = \log(ab)$ % tosi $\Rightarrow$ väite m.o.t.

⌐TAI: $\log\sqrt{ab} = \log(ab)^{\frac{1}{2}} = \frac{1}{2}\log(ab) = \frac{1}{2}(\log a + \log b)$

$= \frac{\log a + \log b}{2}$ % väite ⌟

12.17 $\lg\frac{1}{2} + \lg\frac{2}{3} + \lg\frac{3}{4} + \dots + \lg\frac{98}{99} + \lg\frac{99}{100}$

$= (\lg 1 - \lg 2) + (\lg 2 - \lg 3) + (\lg 3 - \lg 4) + \dots + (\lg 98 - \lg 99) + (\lg 99 - \lg 100)$

$= \underbrace{\lg 1}_{=0} - \underbrace{\lg 100}_{=2} = 0 - 2 = \underline{-2}$

teleskooppi-ilmiö

⌐TAI: $\lg\frac{1}{2} + \lg\frac{2}{3} + \lg\frac{3}{4} + \dots + \lg\frac{98}{99} + \lg\frac{99}{100}$

$= \lg\left(\frac{1}{2}\cdot\frac{2}{3}\cdot\frac{3}{4}\cdot\dots\cdot\frac{98}{99}\cdot\frac{99}{100}\right) = \lg\frac{1}{100}$

$= \lg 1 - \lg 100 = 0 - 2 = -2$ ⌟

13. Logaritmiyhtälö

13.2 a) $\log_8(x+3) = \frac{1}{3}$ $\qquad x+3>0 \Leftrightarrow \underline{x>-3}$

$\Leftrightarrow 8^{\frac{1}{3}} = x+3 \quad \Leftrightarrow \underline{x} = 8^{\frac{1}{3}} - 3 = \sqrt[3]{8} - 3 = 2-3 = \underline{-1}$ käy

⌐Tark. $\log_8(-1+3) = \log_8 2 = \frac{1}{3} \quad \Leftrightarrow \quad 8^{\frac{1}{3}} = 2$ % ⌟

⌐TAI: $\log_8(x+3) = \frac{1}{3} \quad | \; 8^{(\,)}$

$\Leftrightarrow \quad 8^{\log_8(x+3)} = 8^{\frac{1}{3}}$

$\Leftrightarrow \quad x+3 = 8^{\frac{1}{3}} \quad \Leftrightarrow x = 8^{\frac{1}{3}} - 3 = 2-3 = -1$ ⌟

b) $\log_6 4x^2 - 2 = 0$ $\qquad , \underbrace{4x^2}_{\geq 0} > 0 \Leftrightarrow \underline{x \neq 0}$