

01-08-2014

Aim: Practice solving logarithmic equations/inequalities and their systems.

$$\frac{1}{\log_2 x} + \frac{1}{\log_3 x} + \frac{1}{\log_4 x} > 2$$

$$\log_x 2 + \log_x 3 + \log_x 4 > 2$$

$$\log_x 24 > 2$$

$$\log_x 24 > 2 \log_x x$$

$$\log_x 24 > \log_x x^2$$

$$24 > x^2$$

Case 1 $0 < x < 1$, then \log_x is a decreasing function.

$$24 < x^2 \Leftrightarrow x^2 - 24 > 0$$

$$(0, 1) \cap ((-\infty, -2\sqrt{6}) \cup (2\sqrt{6}, +\infty)) = \emptyset$$

Case 2 $x > 1$, then \log_x is an increasing function.

$$(1, +\infty) \cap (-2\sqrt{6}, 2\sqrt{6})$$

$$= (1, 2\sqrt{6})$$