

$$\frac{n^2}{\log n} \times \frac{1}{\log n}$$

$$\frac{\log n}{1} \times \frac{\log n}{n^2}$$

$$\lim_{n \rightarrow \infty} \frac{n \log n}{\frac{n^2}{\log n}} = \lim_{n \rightarrow \infty} \frac{(\log n)^2}{n} = 0$$

⊗ so, $g \in \theta(f)$ does not hold

$g \in O(f)$ holds.

$g \in o(f)$ holds.

$g \in \Omega(f)$ does not hold

$g \in \omega(f)$ does not hold

d) $f(n) = (\log(3n))^3$ $g(n) = 9 \log n$
 $= \lim_{n \rightarrow \infty} \frac{(\log(3n))^3}{9 \log n} = \infty$

⊗ so, $f \in \theta(g)$ does not hold.

$f \in O(g)$ does not hold

$f \in o(g)$ does not hold

$f \in \Omega(g)$ holds.

$f \in \omega(g)$ holds.

$$\lim_{n \rightarrow \infty} \frac{9 \log n}{(\log(3n))^3} = 0$$

⊗ so, ~~$f \in \theta(g)$~~ does not hold

⊗ $g \in \Omega(f)$ does not hold $g \in O(f)$ holds.

⊗ $g \in \omega(f)$ does not hold $g \in o(f)$ holds