$$f(n) = \frac{n^2}{(\log n)} \; ; \; g(n) = n(\log n)^2$$

Answer: $f = O(g)$

Consider $\frac{f(n)}{g(n)} = \frac{\frac{n^2}{\log n}}{n(\log n)^2} = \frac{n}{(\log n)^3}$

Because $\lim_{n \to +\infty} n = +\infty$, $\lim_{n \to +\infty} (\log n)^3 = +\infty$

And at $(0, +\infty]$ both are differeiable, so we could use Hospital rule.

For simplification, $\log n$ based on e, so $(\log n)' = \frac{1}{n}$

$$\lim_{n \to +\infty} \frac{f(n)}{g(n)} = \lim_{n \to +\infty} \frac{n}{(\log n)^3} \overset{\frac{f'}{g'}}{=} \lim_{n \to +\infty} \frac{1}{3 \frac{1}{n} \log n} = \lim_{n \to +\infty} \frac{n}{3 \log n}$$

$$\overset{\frac{f'}{g'}}{=} \lim_{n \to +\infty} \frac{1}{3 \frac{1}{n}} = \lim_{n \to +\infty} \frac{n}{3} = +\infty$$

So $f(n)$ dominates $g(n)$

$f = O(g)$