Theorem (3.2.8a)**.** *Let f be the function defined by $f(x) = 2x^2 + x^3 \log x$. $f(x)$ is $\mathcal{O}(x^4)$.*

Proof. Let g be the function defined by $g(x) = x^4$. If $x \geq 1$, then

$$f(x) = (2x^2 + x^3 \log x) \leq (2x^2 + x^4) \leq (2x^4 + x^4) = 3x^4.$$

Thus, $|f(x)| \leq 3|g(x)|$, for all $x > 1$, and therefore $f(x)$ is $\mathcal{O}(x^4)$ with constant witnesses $C = 3$, and $k = 1$. ■