Theorem (3.2.2c). *Let f be the function defined by f(x) = x log x.*
f(x) is $\mathcal{O}(x^2)$.

Proof. Let g be the function defined by $g(x) = x^2$. $\log x \leq x$ is true for all x in the domain of any logarithmic function. Certainly, $x \log x \leq x^2$, for all $x > 0$. From the domain of f, and from the definitions for f and g, that is $|f(x)| \leq 1|g(x)|$, for all $x > 0$. Therefore, $f(x)$ is $\mathcal{O}(x^2)$ with constant witnesses $C = 1$, and $k = 0$. ∎