

Theorem (3.2.21a). *Let f be the function $f(n) = n \log(n^2 + 1) + n^2 \log n$. $f(n)$ is $\mathcal{O}(n^2 \log n)$.*

Proof. $f(n)$ is $\mathcal{O}(n^2 \log n)$ follows directly from the fact that a k^{th} degree polynomial is $\mathcal{O}(x^k)$. Since $n \log(n^2 + 1) + n^2 \log n$ is a 2^{nd} degree polynomial in $n^2 \log n$ with a constant coefficient 1, $f(n)$ is $\mathcal{O}(n^2 \log n)$. ■