

In my course notes, I have a slightly weaker version of Taylor's Inequality than what we should be using.

**Theorem (Taylor's inequality):** Suppose that  $f(x)$  is  $n + 1$  times continuously differentiable on an interval  $I$  containing  $a$  and let  $T_n(x)$  denote the  $n$ th Taylor polynomial for  $f$  centred at  $a$ . If there is a constant  $M \geq 0$  such that for any point  $x \in I$ , we have that  $|f^{(n+1)}(x)| \leq M$ , then for any  $x \in I$ , we have

$$|f(x) - T_n(x)| \leq \frac{M}{(n+1)!} |x - a|^{n+1}$$