

1. Suppose x is a fixed real number and f is a function that is $n + 1$ times differentiable on an interval J containing x . Define:

$$F(t) = f(x) - \left[f(t) + \frac{f'(t)}{1!}(x-t) + \frac{f''(t)}{2!}(x-t)^2 + \frac{f'''(t)}{3!}(x-t)^3 + \dots + \frac{f^{(n)}(t)}{n!}(x-t)^n \right]$$

for $t \in J$. Prove:

$$F'(t) = -\frac{(x-t)^n}{n!}f^{n+1}(t).$$