

### Guidelines For Finding a Taylor Series

1. Differentiate  $f$  with respect to  $x$  several times and evaluate each derivative at  $c$

$$f(c), f'(c), f''(c), \dots, f^{(n)}(c), \dots$$

Try to recognize a pattern in these numbers.

2. Use the sequence developed in the first step to form the Taylor coefficients  $a_n = \frac{f^{(n)}(c)}{n!}$  and determine the interval of convergence for the resulting power series

$$f(c) + f'(c)(x - c) + \frac{f''(c)}{2!}(x - c)^2 + \dots + \frac{f^{(n)}(c)}{n!}(x - c)^n + \dots$$

3. Within this interval of convergence, determine whether the series converges to  $f(x)$ .