

# Taylor Expansions

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# 2D Taylor Polynomial

- In previous courses, should have seen the form



$$\sum_{k=0}^n \frac{1}{k!} f^{(k)}(a)(x-a)^k$$

# 3D Taylor Polynomials

- Adding the extra variable leads to



$$f(x_0 + \Delta x, y_0 + \Delta y) \approx \sum_{l,m \geq 0}^{l+m \leq n} \frac{1}{l!m!} \frac{\partial^{l+m} f}{\partial x^l \partial y^m}(x_0, y_0) (\Delta x)^l (\Delta y)^m$$