

Power Series Coefficients

Consider the power series

$$f(z) = \sum_{n=0}^{\infty} c_n (z - z_0)^n$$

expanded around the point z_0 . In lecture we derived that the coefficients are given by

$$c_n = \frac{1}{n!} f^{(n)}(z_0)$$

1. Find the first four nonzero coefficients for $\sin \theta$ expanded around the origin.
2. Write out the series approximation, correct to fourth order, for $\sin \theta$ expanded around the origin.

$$\sin \theta = \underline{\hspace{15em}}$$

3. Find the first four nonzero coefficients for $\sin \theta$ expanded around $\theta_0 = \frac{\pi}{6}$.
4. Write out the series approximation, correct to fourth order, for $\sin \theta$ expanded around $\theta_0 = \frac{\pi}{6}$.

$$\sin \theta = \underline{\hspace{15em}}$$

5. What does it mean to write a series expansion around the point a ?
6. Briefly describe in words how to expand the series approximation for a function, correct to fourth order.