

1. Let $g(x) = \sin(x)$ and suppose that

$$S(x) = \sum_{k=0}^{\infty} a_k x^k = a_0 + a_1 x + a_2 x^2 + a_3 x^3 + \cdots$$

is a power series expansion of $g(x)$.

- (a) Find the first four derivatives of $g(x)$ and $S(x)$.
- (b) Use that $g(0) = S(0)$, $g'(0) = S'(0)$, etc to find the values for a_0, a_1, \dots, a_4 .
- (c) Follow the pattern to find $S(x)$.
2. Find a power series expansion for $\cos(x)$.
(Hint: $\frac{d}{dx} \sin(x) = \cos(x)$)