

1. Find the power series expansion for $f(x)$ at $x_0 = 0$.

1.1 $f(x) = \sin(x)$

1.2 $f(x) = \cos(x)$ Hint: $\frac{d}{dx} \sin(x) = \cos(x)$

2. 2.1 Find the power series expansion for $\sin(x^2)$

2.2 Use this to find $\int \sin(x^2) dx$

2.3 Approximate $\int_0^1 \sin(x^2) dx$ accurate within 10^{-5}

Use series to approximate the value of the following integrals accurate within 0.001.

1. $\int_0^1 \cos(x^3) dx$

2. $\int_0^{1/4} \frac{1}{1+x^4} dx$

Hint: $\frac{1}{1+x^4} = \frac{1}{1-(-x^4)}$

3. $\int_0^1 xe^{x^3} dx$