1. Find power series expansions about $x_0 = 0$ for the following:

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

   (b) $f(x) = \cos(x)$

   (c) $\cos(x^2)$

   (d) $\int \cos(x^2)\ dx$

   Then approximate $\int_0^1 \cos(x^2)\ dx$ accurate within 10^{-5}.

2. Find power series expansions of the following integrals. Approximate the value of the following integrals accurate within 0.001.

   (a) $\int_0^1 e^{-x^3}\ dx$

   (b) $\int_0^{1/4} \frac{1}{1+x^4}\ dx$