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

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

II. 1. Find the power series expansion for $\cos(x^2)$
2. Find $\int \cos(x^2)\ dx$
3. Approximate $\int_0^1 \cos(x^2)\ dx$ accurate within 10^{-5}