Bsc Software Design (Game/Web Dev.) Year 1
Mathematics 1
Tutorial #4

Taylor Series

For each of the following functions, determine the first five terms of their Taylor Series about $x_0=0$:

1. $f(x)=\cos(x)$
2. $f(x)=\ln|1+x|$
3. $f(x)=e^{2x}$
4. $f(x)=\sin(3x)$
5. $f(x)=\tan(x)$
6. $f(x)=2^x$
7. $f(x)=\sqrt{x}$

Explain why the Taylor Series of each of the functions above has an infinite number of terms.

Taylor Series Approximations to functions

For each of the following functions:

(a) Find the first five terms in the Taylor Series about the specified x_0 .
(b) Use these terms to approximate the functions at the specified x.
(c) Using your calculators, determine the error of the approximations in (b) above.

1. $f(x)=\sin(x);\ \ x_0=\pi/2;\ \ x=\pi/4$
2. $f(x)=e^{2x};\ \ x_0=1;\ \ x=2$
3. $f(x)=\sqrt[3]{x};\ \ x_0=0;\ \ x=3$
4. $f(x)=\ln|x|;\ \ x_0=1;\ \ x=e^3$
5. $f(x)=3^x;\ \ x_0=1;\ \ x=2;$