



Taylor Series - Tutoring Sheet #6

1. Obtain the expansion of the following functions as indicated :

a. $f(x) = e^{\frac{x}{2}}$ according to powers of x

b. $f(x) = \ln x$ according to powers of $x - 2$

c. $f(x) = \cos^2 x$ according to powers of x

d. $f(x) = \frac{1}{1+x^2}$ according to powers of x

deduce the expansion of **arctanx** by evaluating $\int_0^x \frac{dx}{1+x^2}$

2. Use the expansions of e^{ix} , $\cos x$ and $\sin x$ to show that:

$$e^{ix} = \cos x + i \sin x$$

3. Evaluate using expansion, the following integral : $\int_0^1 \frac{\sin x}{x} dx$

4. Using the expansions of e^x and $\sin x$, $\cos x$, find the expansions of the following:

a. $e^{1-\sin x}$

b. $e^x \cos x$