



## Numerical Integration- 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.  $e^x \cos x$

5. Use Simpson's rule as indicated to evaluate the following integrals:

a.  $\int_0^1 e^{-x^2} dx$  with 5 ordinates

b.)  $\int_1^3 \ln x dx$  with 9 ordinates ; Compare your answer with a precise answer obtained by integration by parts or otherwise.