Analysis 2 - HW 1

Note Title 1/25/2013

1) Find the Taylor series centered at $c=0$ and its radius of convergence for:

a) $f(x) = e^x$

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

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

Note that this means you have to find the proper coefficients for the power series, but you <u>also</u> must show that the Taylor series really does converge.

2) Find the Taylor series centered at $c=0$ for:

a) $f(x) = \ln(1-x)$

b) $g(x) = \ln(1+x)$

c) $h(x) = \arctan(x)$

Note that if you base your new series on an existing series, you <u>don't</u> have to show that the reminder goes to zero.

3) In Taylor's thm remainder is given as

$$R_{n+1}(x) = \frac{1}{n!} \int_c^x (x-t)^n f^{(n+1)}(t)\, dt$$

Prove that R_{n+1} can also be written as:

$$R_{n+1}(x) = \frac{f^{(n+1)}(t)}{(n+1)!}(x-c)^{n+1}$$

This is called Lagrange Remainder formula (Prop. 8.4.8)