

### Homework 3 × (20 points each)

1. Consider the Taylor expansion of  $e^x$  show at which  $x$  it will become a Taylor series.

2. The same as above for  $\ln(1+x)$  function.

3. For power series show that if

$$\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = R^{-1} \text{ then}$$

the series converge for

$$-R < x < R$$

4. Prove the Uniqueness Theorem

5. Obtain power series for  $\sin(x)$  and  $\cos(x)$  functions

6. Prove the l'Hopital's rule.