Worksheet on Power Series

Math 42, Fall 2004

Let $f(x)$ be a function defined by a power series:

$$f(x) = \sum_{n=0}^{\infty} \frac{x^n}{n!}\,.$$

In this worksheet, we will find out some properties of $f(x)$ and use them to identify it as a more familiar function.

1. What is the interval of convergence of $f(x)$?

2. Compute $f'(x)$, and prove that $f'(x) = f(x)$.

3. Let $y = f(x)$. Use Question 2 to set up a differential equation about y.

4. Solve this differential equation. Use the original formula for $f(x)$ to get an initial condition.

5. What function is $f(x)$?