

Math Background

1. Show that (assume $|x| < 1$)

$$1 + x + x^2 + x^3 + \dots = \frac{1}{1-x}$$

2.
$$\sum_{n=0}^{\infty} \frac{x^n}{n!} = ?$$

3. Write down the real and imaginary parts of z , where

$$z = \frac{2+i}{1-i}, \quad i = \sqrt{-1}$$

4. Expand $\cos(A+B)$ in terms of cosines and sines of A and B .

5. Write down partial derivatives of

$$f(x,y) = x^2 \sin(y) + y \cos(x^2)$$

with respect to x and y .

6. Given a continuous probability distribution function,

$$p(x) = Ae^{-\alpha|x|}, \quad -\infty < x < +\infty.$$

Express A in terms of α .

7. Integrate
$$\int_0^{\infty} \frac{dx}{1+x^2}$$