1. Keener 4.1.8 (p.172)

2. Consider the following distribution defined by the multiplication of two Heaviside (step) functions:

\[ H_5(x) = H(x - 5)H(x + 5) \]

(a) Find the derivative \( d(H_5)/dx \) in the sense of distributions.

(b) What does this say about the product rule for distributions?

(c) Compare the derivative in (a) to the derivative of the product

\[ H_5(x) = H(5 - x)H(x + 5) \]

3. Keener 6.2.4 (p.275)

4. Show that if an analytic function \( f(z) \) in \( \mathbb{C} \) has purely real values (i.e. the range of \( f \) is in \( \mathbb{R} \)), then \( f \) is a constant.

5. (a) Is \( f = z\bar{z} \) an analytic function?

(b) Is \( f = z + \frac{1}{z} \) an analytic function for all \( z \)?

6. Keener 6.3.1 (p.276)

7. Keener 6.3.5 (p.276)