

Problem Set #3

ESS 590G/H

Due Tuesday 2/21/2017

1. Problem 5, p. 213 Stix (1992) reproduced here:

5. Analytic Continuation. For the analytic function $I(z)$ defined by the integral along the real v axis

$$I(z) = \int_{-\infty}^{\infty} dv \frac{f(v)}{v - z} \quad (104)$$

obtain the expansion in powers of $y = \text{Im } z$, for $x = \text{Re } z$, and where $f^{(n)}(v)$ is the n th derivative of $f(v)$:

$$I(x \pm iy) = \sum_{n=0}^{\infty} \frac{(\pm iy)^n}{n!} \left[P \int_{-\infty}^{\infty} dv \frac{f^{(n)}(v)}{v - x} \pm \pi i f^{(n)}(x) \right]. \quad (105)$$

This expansion exhibits the real and imaginary parts of $I(x \pm iy)$ explicitly (J. D. Jackson, 1958).

2. Nicholson Chapter 6, Exercise P. 91 (a) and (b)
3. Nicholson Chapter 6 Problem #6.5 “Two drifting Cauchy distributions”
4. Nicholson Chapter 6 Problem #6.6 “Isotropic Stability”