UM–SJTU Joint Institute

VV557 Methods of Applied Math II

Assignment 2

Group 22

Sui, Zijian  515370910038
Wang, Tianze  515370910202
Xu, Yisu   118370910021

### Exercise 2. 1

### Exercise 2. 2

### Exercise 2. 3

The distribution of $P(\frac{1}{x})$ is given as

$$\mathcal{P}\left(\frac{1}{x}\right)(\varphi) := \lim_{\varepsilon \to 0} \int_{|x|>\varepsilon} \frac{\varphi(x)}{x} dx$$

Observing the distribution of $P(\frac{1}{x^2})$ is given as

$$\mathcal{P}\left(\frac{1}{x^2}\right)(\varphi) := \lim_{\varepsilon \searrow 0} \int_{|x|>\varepsilon} \frac{1}{x^2}(\varphi(x) - \varphi(0))dx$$

So we express it in the form of

$$\mathcal{P}\left(\frac{1}{x^2}\right)(\varphi) = \lim_{\varepsilon \searrow 0} \int_{|x|>\varepsilon} \left(-\frac{d}{dx}(\frac{1}{x})\right) \cdot \left(\int_\varepsilon^x (\frac{d}{dt}\varphi(t))dt\right) dx$$