Exercises   page 267

Is $f(x) = \frac{1}{x}$ locally integrable on $(0,1)$

Take any $[a,b] \subset (0,1)$

$$\int_a^b |f(x)| dx = \int_a^b |\frac{1}{x}| dx = \ln b - \ln a < \infty$$

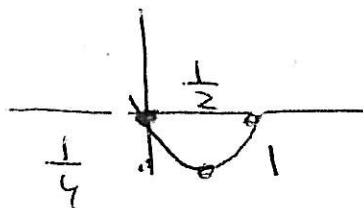Thus f is locally integrable on $(0,1)$. Note that $\int_0^1 \frac{1}{x} dx$ does

↑ improper

not exist.

Exercise 2 page 267

Is the function $\phi(x) = x(1-x)$ on $(0,1)$ a test function. Why or why not

Solution

So $\overline{\text{supp} \phi} = [0,1]$. It is not contained in $(0,1)$ so it is not a test function