# Solutions to Walter Rudin's $Functional\ Analysis$

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 $\label{eq:ABSTRACT.} \text{ This document contains solutions to the exercises of Walter Rudin's } \textit{Functional Analysis}.$ 

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# Part I General Theory

# **Topological Vector Spaces**

- Exercise 1.1.
- Exercise 1.2.
- Exercise 1.3.
- Exercise 1.4.
- Exercise 1.5.
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- Exercise 1.24.

# Completness

- Exercise 2.1.
- Exercise 2.2.
- Exercise 2.3.
- Exercise 2.4.
- Exercise 2.5.
- Exercise 2.6.
- Exercise 2.7.
- Exercise 2.8.
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- Exercise 2.15.
- Exercise 2.16.

# Convexity

- Exercise 3.1.
- Exercise 3.2.
- Exercise 3.3.
- Exercise 3.4.
- Exercise 3.5.
- Exercise 3.6.
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- Exercise 3.8.
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3. CONVEXITY 8

- Exercise 3.26.
- Exercise 3.27.
- Exercise 3.28.
- Exercise 3.29.
- Exercise 3.30.
- Exercise 3.31.
- Exercise 3.32.
- Exercise 3.33.

# **Duality in Banach Spaces**

- Exercise 4.1.
- Exercise 4.2.
- Exercise 4.3.
- Exercise 4.4.
- Exercise 4.5.
- Exercise 4.6.
- Exercise 4.7.
- Exercise 4.8.
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- Exercise 4.26.
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# Some Applications

- Exercise 5.1.
- Exercise 5.2.
- Exercise 5.3.
- Exercise 5.4.
- Exercise 5.5.
- Exercise 5.6.
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- Exercise 5.16.
- Exercise 5.17.
- Exercise 5.18.
- Exercise 5.19.

# Part II Distributions and Fourier Transforms

#### Test Functions and Distributions

- Exercise 6.1.
- Exercise 6.2.
- Exercise 6.3.
- Exercise 6.4.
- Exercise 6.5.
- Exercise 6.6.
- Exercise 6.7.
- Exercise 6.8.
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- Exercise 6.26.
- Exercise 6.27.

### Fourier Transforms

- Exercise 7.1.
- Exercise 7.2.
- Exercise 7.3.
- Exercise 7.4.
- Exercise 7.5.
- Exercise 7.6.
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- Exercise 7.8.
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- Exercise 7.24.

# Applications to Differential Equations

- Exercise 8.1.
- Exercise 8.2.
- Exercise 8.3.
- Exercise 8.4.
- Exercise 8.5.
- Exercise 8.6.
- Exercise 8.7.
- Exercise 8.8.
- Exercise 8.9.
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- Exercise 8.14.
- Exercise 8.15.
- Exercise 8.16.

# Tauberian Theory

- Exercise 9.1.
- Exercise 9.2.
- Exercise 9.3.
- Exercise 9.4.
- Exercise 9.5.
- Exercise 9.6.
- Exercise 9.7.
- Exercise 9.8.
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- Exercise 9.14.
- Exercise 9.15.

# ${\bf Part~III}$ Banach Algebras and Spectral Theory

# Banach Algebras

- Exercise 10.1.
- Exercise 10.2.
- Exercise 10.3.
- Exercise 10.4.
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- Exercise 10.26.

# Commutative Banach Algebras

- Exercise 11.1.
- Exercise 11.2.
- Exercise 11.3.
- Exercise 11.4.
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- Exercise 11.22.

# Bounded Operators on a Hilbert Space

- Exercise 12.1.
- Exercise 12.2.
- Exercise 12.3.
- Exercise 12.4.
- Exercise 12.5.
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# **Unbounded Operators**

- Exercise 13.1.
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