# Chapter 2

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Link to chapter

# 1 Data Manipulation

- Familiarity with vectors, matrices and tensors

- Broadcasting mechanism

- Indexing

- Memory considerations X[:] = X+Y

# 2 Data Preprocessing

- Loading data with Pandas

- Missing data

  - Imputation using mean
  - One hot encoding missing values

# 3 Linear Algebra

- Scalars, Vectors, Matrices and Tensors

- Transpose, Tensor Arithmetic, Hadamard product (element-wise)

- Reduction (summing over some set of axis)

- Matrix-vector and matrix-matrix Products

- Norms

# 4 Calculus

- Sum, product, quotient and chain rules of differentiation

- Partial derivatives

- Gradient

# 5 Autograd

- requires_grad

- detach()

# 6 Probability

- Basic Probability

- Law of large numbers

- Random variables

- Conditional and joint probability

- Bayes theorem, marginalization and independence

- Expectation and variance

# References

Zhang, A., Lipton, Z. C., Li, M., & Smola, A. J. (2020). *Dive into deep learning.* (`https://d2l.ai`)