

# 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

## References

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