

# Homework 2, Fall 2025 18338

Due 9/24 11:59pm

Please submit your homework via [canvas.mit.edu](https://canvas.mit.edu).

If you are submitting .jl or .ipynb files, you must additionally submit .html or .pdf file that captures running notebook or code.

## Reading and Notes

Read chapters 7, 13, 14, 21 of the class notes (The lecture notes can be found in Piazza: <http://piazza.com/mit/fall2025/18338>).  
Optional, but if you do this I'll get to know you : Provide feedback especially high level style and where things did not make sense, in addition to spelling or technical errors.

## Problem sets

1. Do at least four of the following problems.

- Exercise 7.1 (page 124)
- Exercise 7.2 (page 124)
- Exercise 7.3 (page 126)
- Exercise 7.4 (page 129)
- Exercise 7.5 (page 130)
- Exercise 7.6 (page 131)

2. See Lanczos tridiagonalization at page 254. Prove that the following sequence readily solves for the red variables in the Lanczos tridiagonalization algorithm:

$$\hat{w}_k = Dq_k, \alpha_k = \hat{w}_k^T q_k, w_k = \hat{w}_k - \alpha_k q_k - \beta_{k-1} q_{k-1}, \beta_k = \|w_k\|, q_{k+1} = w_k / \beta_k$$

3. Do at least four of the following problems.

- Exercise 13.1 (page 263)
- Exercise 13.2 (page 264)
- Exercise 13.3 (page 264)
- Exercise 13.4 (page 265)
- Exercise 13.5 (page 265)
- Exercise 13.6 (page 265)