6.S098 Homework 1

IAP 2022

The homeworks problems are drawn from Boyd's additional exercises found here

1) Problem 17.25 (hint this can be done using linear programming)

- **Data files:**
  - yield_curve_data.jl
  - yield_curve_data.py

2) Problem 19.7

- **Data files:**
  - graph_isomorphism_data.jl
  - graph_isomorphism_data.py

3) Problem 4.3 (in the programming language of your choice)

4) Let x be a vector of size n. Consider the program:

$$\max \mathbf{1}_n^T x$$
$$\text{subject to } \|x\|_1 \leq 1$$

using CVXPY or Convex.jl solve this program by writing the constraint as:

1. $\pm x_1 \pm x_2 \pm \cdots \pm x_n \leq 1$ for all combinations of signs (2^n constraints)
2. $-y_i \leq x_i \leq y_i$, $\sum_i y_i = 1$
3. using the built in norm function

Compare the average time to transcribe and solve 100 instances of the three problems for $n = 2, 5, 10$