

**Math 420, Spring 2022**  
**Solo Homework 1**  
**Returns Means and Variances**

Due Monday, 31 January, 2022

**Exercise 1.** Describe the assets in the six funds VFINX, VBMFX, VGSLX, VIMAX, VSMAX, and VGTSX. (A few sentences about each is all that you need.)

**Exercise 2.** Use adjusted daily closing prices to compute the daily returns of these assets over the two years 2020-2021. Use uniform weights to compute  $m_i$ ,  $v_{ij}$ , and  $c_{ij}$

- (i) over the one year 2021;
- (ii) over the two years 2020-2021.

Display each  $m_i$  as a 6-vector  $\mathbf{m}$  and each  $v_{ij}$  and  $c_{ij}$  as  $6 \times 6$ -matrices  $\mathbf{V}$  and  $\mathbf{C}$ . Each entry should be shown to four significant digits. Compare these arrays computed over one year (i) with the corresponding arrays computed over two years (ii).

**Exercise 3.** Use your answers to Exercise 1 to give explanations for the values of each  $c_{ij}$  with  $i \neq j$  that you computed in Exercise 2.

**Exercise 4.** Compute a complete set of eigenpairs for each of the two  $6 \times 6$ -matrices  $\mathbf{V}$  that you computed in Exercise 2. What conclusions do you draw about these assets from the relative size of the eigenvalues?