

Hints for homework problems

Math 20610, Spring 2026
First assignment, due 1/23/26

1. §1.2, # 21. Note book's answer isn't quite right.
2. §1.2 # 44. Here are a few hints.
 - (a) Let x_1, x_2, x_3, x_4 respectively be the variables corresponding to the question marks on JFK, Mt. Auburn, Dunster and Winthrop streets.
 - (b) The square in the middle has corners corresponding to the intersections of two of the roads. At any such corner, the number of cars coming in equals the number of cars going out. Come up with four linear equations to reflect this fact. As an illustration, the intersection of JFK and Mt. Auburn gives the linear equation

$$300 + x_1 = 400 + x_2.$$

Find the other three equations, and use row reduction to solve for x_1, x_2, x_3, x_4 .

- (c) It'll turn out that there are infinitely many solutions, so you have to find the general solution. Use x_4 as the parameter.
- (d) Note x_1, x_2, x_3, x_4 all have to be ≥ 0 since the roads are one-way. The inequality $x_4 \geq 0$ leads to inequalities involving x_1, x_2 and x_3 .

For example, if your solution included $x_1 = x_4 - 200$ (it doesn't but this is an example) then to have $x_1 \geq 0$ you'd need $x_4 \geq 200$.

Similarly, if your solution included $x_2 = 300 - x_4$ (it doesn't but this is an example) then to have $x_2 \geq 0$ you'd need $x_4 \leq 300$.

Use this to get bounds on x_1, x_2, x_3, x_4 .