Please write all answers in legible handwriting in the space provided. **3** points will be added to
your score for signing your name, though those points will be deducted if the grader cannot read
what you wrote on your pdf scan. For math questions, show all relevant work. **For questions
with numeric answers, clearly circle or box your final answer.**

Total points possible: 25

1. (7 points) **Utility.** Suppose we have two cities, 1 and 2. Assume every individual has the same
   utility function given by:

   $$u(w_j, r_j) = 4 * w_j - 0.75 * r_j$$

   where $j = 1$ or $j = 2$. Furthermore, for all parts of the problem assume the total population is
   fixed at $1,000$ and wages in each city are given by:

   $$w_1 = 15$$
   $$w_2 = 12$$

   (a) (1 point) What is the utility from each choice if $r_1 = 20$ and $r_2 = 15$. Is this an equilib-
       rium? How do you know? (2 points)

   (b) (2 points) For the rest of the problem you can now assume that rents are increasing in
       the population of each city. Specifically, assume $r_1(L_1) = 4 * L_1$ and $r_2(L_2) = 8 * L_2$.
       Compute the equilibrium population of each city equilibrium rents. (2 points)

(c) (2 points) Now suppose the government decides to levy a flat income tax of 10% on **all workers**. What are the new equilibrium population levels in each city? **Note**: your answer may include fractions/numbers with decimals (2 points)

(d) (2 points) Now the the government levels the 10% income tax on only people in city 1. What are the new equilibrium population levels in each city? Compare your answer to part (c). How did it change? Why? (2 points)

2. (12 points) **Land-Use Regulations.** Suppose the rental market in Eugene is perfectly competitive and characterized by the following equations:

$$\text{Demand}: R_d = 20 - H_d$$
$$\text{Supply}: R_s = (1+k) * H_s$$

where R is rental price, and k is the level of land-use restrictions in Eugene. For now, we will not assign a value to k.

(a) (2 points) Solve for the equilibrium price and quantity in terms of k. What happens to equilibrium price and equilibrium quantity as you increase the land use regulations (increase k)?

(b) (2 points) Graphically illustrate your answer to part (a). That is, draw the initial equilibrium, and illustrate what happens to the equilibrium when k increases.

(c) (2 points) Now suppose $k = 2$. Compute the equilibrium using the equations derived in part (a).

(d) (2 points) The Eugene public is upset over high rental prices so they demand that the local government fixes the issue. They deem that the maximum price anybody should pay for rent is one less than the equilibrium price you computed in part (c). The local government implements a rent control of of the price in (c) minus 1. Quantify the shortage of housing arising from the rent control when $k = 2$ using the supply and demand equations.

(e) (2 points) An alternative to rent control would be to lower land-use restrictions. Find the level of land use restrictions k such that equilibrium rents are the equilibrium price with rent control in part (d). Show your work.

(f) (2 points) In the housing market, which policy is more efficient? (Think back to the 201 definition of efficiency). Does the solution proposed in part (e) involve any costs? What might be some consequences to lowering land use regulations? No math is needed. (1 points)

3. (10 points) Recall this figure. In a short paragraph, interpret this figure in your own words and discuss the main insights of its result. Specifically, what evidence does this result provide regarding the geography of social mobility and the casual effects of neighborhoods? *Note: You may replace Savin Hill with "high opportunity areas" and Roxbury with "low opportunity areas"*

Income Gain from Moving to a Better Neighborhood

By Child's Age at Move