EC1410-Spring 2026
Problem Set 9

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When you write up your answers, your goals should be to (1) be correct, and (2) convince your reader that your answer is correct. It is always helpful if your work is legible and if all steps are presented, possibly with a line of explanation. Answers that do not achieve these goals will not be awarded full credit. 100 points are possible. Points for each problem given in parentheses.
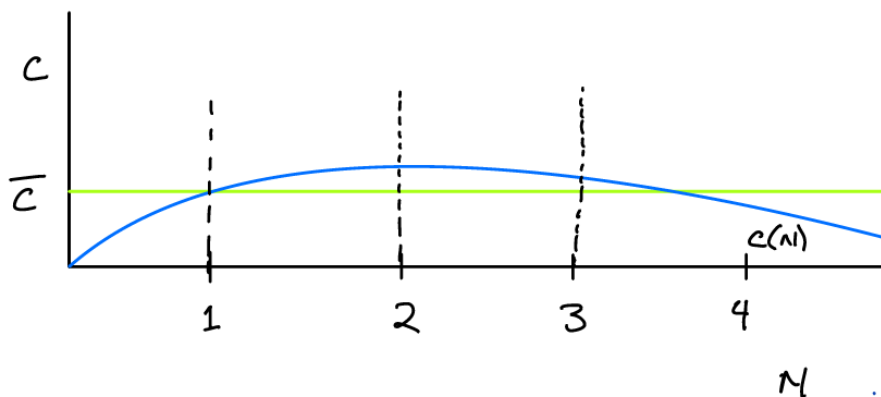
Problems

1. Suppose that the shares of three industries in city i are

$$S_{i1} = \frac{1}{10}, \; S_{i2} = \frac{1}{10}, \; S_{i3} = \frac{8}{10}$$

   (a) (15) Evaluate the Herfindahl index for this city.

   (b) (15) Suppose the share of each industry in national employment is $\frac{1}{3}$. Evaluate the relative specialization for city i, RZI_i.

2. In this problem we will repeat the derivation of $c_E(N)$ for a circular city. Recall that household consumption is the difference between wages and average commute costs, or

$$c_E(N) = w(N) - \frac{TC(N)}{N} = AN^\sigma - \frac{TC(N)}{N}$$

   (a) (10) First, assuming that $\bar{l} = 1$, and the city extends to $\bar{x}$, what is the population of the city?

   (b) (10) Recall that for an individual located at x, commuting costs are $2t|x|$. What is the total commuting cost of this city?

   (c) (10) What is the average commuting cost?

   (d) (10) Plug the average commuting cost into the formula for $c_E(N)$. Plot $c_E(N)$.

3. Consider the relationship between city size and consumption as given below. Note that the utility for being the only person in a city is zero.

   (a) (15) Suppose we must assign 6 people to cities. What possible equilibrium configurations can be maintained? Are there any unstable equilibria?

   (b) (15) What would a real estate developer do? Why?