1 Breakfast (25 points)

Consider a Robinson Crusoe economy: it’s Sunday morning and Jim is lounging around. He is an economy of one and there are two goods, ‘pancakes’ \(y\) and ‘leisure’. Chef Jim produces pancakes using the input ‘labor’ \(l\), which is the inverse of leisure. His production function is \(y = 4\sqrt{l}\). Let the price of pancakes be 1 and the price of labor, the wage, be \(w\).

a) Write Chef Jim’s profit function. Find Chef Jim’s optimal choice of production plan and the amount of profit he makes, as a function of \(w\).

Hungry Jim consumes pancakes and supplies labor to Chef Jim. He earns \(w\) per unit of labor supplied, and also receives the profits from Chef Jim. Hungry Jim likes pancakes but dislikes working: his utility function is \(U = 2y - 2l^2\).

b) Write Hungry Jim’s utility function, substituting in what you know about \(y\). Find Hungry Jim’s optimal choice of consumption bundle as a function of \(w\).

c) Find a competitive equilibrium in this economy.

2 Sketching Robinson Crusoe (25 points)

Consider an economy with one producer and one consumer. There are two goods, \(x\), which has a price of \(w\), and \(y\), which has a price of 1. The producer aims to maximize profit by producing \(y\) with a single input \(x\) according to the production function \(y = 3x^{3/4}\). The consumer aims to maximize her utility function \(u = y - x^2\). She consumes \(y\), supplies \(x\) to the producer for \(w\) per unit, and owns the firm so receives its profits.

Is there a competitive equilibrium in this ‘Robinson Crusoe’ economy with \(w = 4\)? Sketch a picture that represents this situation with \(w = 4\) (you don’t have to plot out the various functions with perfect accuracy, but things should be in roughly the right place).

3 Short answers (25 points)

a) Say that an economy with production is at a competitive equilibrium. The welfare theorems hold. What can we learn about the economy from its equilibrium prices?

b) Using an example in which there are two producers and two possible goods, discuss in a few non-technical sentences the concept of comparative advantage in production.

4 Taxation and elasticity (25 points)

You’re advising a government that needs to raise a given amount of tax revenue. A per-unit tax will be levied on one of two goods, and you have been asked to decide which. The supply curves in both markets are similar and upward-sloping, but in one market demand is quite price inelastic, and in the other demand is quite price elastic.
What would be some of the different implications of taxing one good versus the other? Which of the two goods would you recommend taxing and what was the most important factor that made you choose that way? Think of an example of a specific good of the type you have chosen to recommend taxing.

You should motivate your answer with partial equilibrium analysis (sketching graphs will probably be helpful but you don’t have to include them in your final submitted solution unless you want to). Please limit your answer to 6-7 sentences—this means you’ll have to distill your analysis into a short explanation and recommendation. There is no single correct answer here, particularly since the second question is a normative question.