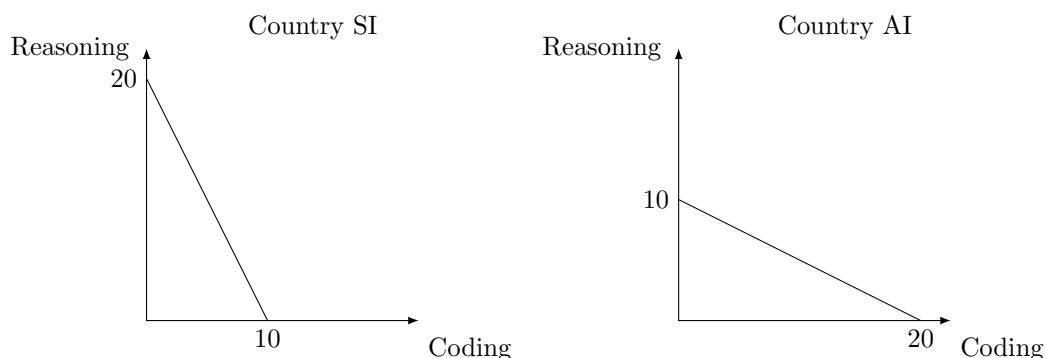# STA501: Data-based Decision Making

Problem Set 1

Question 1. Consider the following productivity data for SI and AI. **A fixed amount of labor hours** can produce:

	SI	AI
Math	15	10
Stat	30	40

1. Who has the absolute advantage in the production of Math? Who has the absolute advantage in the production of Stat? Briefly explain your answers.

2. Who has the comparative advantage in the production of Math? Who has the comparative advantage in the production of Stat? Briefly explain your answers.

3. If SI and AI trade in these two goods, who would export Math in exchange for Stat and why?

4. Who would benefit from trade? Why?

5. What are the terms of trade for both goods? Give an example of P_{math} at which AI would refuse to trade. Briefly explain why she would not trade at that price.

6. What happens, if the amount of available labor hour is infinite?

Question 2. Using equal amounts of labor hours, Country SI and Country AI can each produce the number of Reasoning and Coding shown in the production possibilities curves above. Based on the information, which of the following is true?

1. Country SI has an absolute advantage in the production of both Reasoning and Coding and a comparative advantage in the production of Reasoning.

2. Country AI has an absolute advantage in the production of both Reasoning and Coding and a comparative advantage in the production of Coding.

3. Countries SI and AI can engage in a mutually advantageous trade by exchanging 1 watch for 1 Coding

4. Country AI is willing to give up 2 Reasoning in exchange for 1 Coding from Country SI.

5. Country SI is willing to give up 2 Coding in exchange for 1 Reasoning from Country AI.

Question 3. The table in the left shows labor endowments of two countries, Stonia and Veniam and their unit labor requirements for producing two goods, stuff and nonsense. The table right shows the quantities of these two goods that each produces in autarkym and below that has cells to record what they might consume with free trade.

	Stonia	Venia
Labor	300	600

Unit labor requirement		
Stuff	2	4
Nonsense	1	5

	Stonia	Venia
Autarky consumption		
Stuff	90	40
Nonsense	120	88

Free trade consumption		
Stuff	100	50
Nonsense	200	100

1. Fill in these empty cells, assuming that each country specializes completely in (that is, uses all of its labor to produce only) the good in which it has a comparative advantage. Assume that with trade Stonia is consumes exactly 2/3 of the two countries' combined output of each good.

   As in questions 3, Stonia has a comparative advantage in nonsense, while Venia has a comparative advantage in stuff. When each specializes, Stonia will produce 300/1=300 units of nonsense, of which it will consume 2/3=200 and export 1/3=100 to Venia. Venia will produce 600/4=150 units of stuff, keep 1/3=50 for itself and export the rest, 100, to Stonia.

2. How much does each country export and import of each good in the free trade situation? Is there evidence here that the countries have gained from trade?

   As stated above, Stonia exports 100 units of nonsense to Venia and Venia exports 100 units of stuff to Stonia. We see the gains from trade in the fact that each country is consuming more of each good with trade than in autuarky.

Question 4. Auto manufacturing is a big industry. The table below summarizes the number of hours it takes to manufacture cars in the high-tech developed countries compared to the rest of the world.

	Number of Hours to Make One High-Quality Car	Number of Hours to Make One Low-Quality Car
High-tech Countries	30	20
Other Countries	60	30

1. Which set of countries has an absolute advantage at making high-quality cars? Which set of countries has an absolute advantage at making low-quality cars?

2. Estimate the opportunity cost of making high- or low- quality cars in each set of countries.

3. Which set of countries has a comparative advantage for manufacturing high quality cars? Which set of countries has a comparative advantage for manufacturing low quality cars?

Question 5. In Australia one unit of labor can produce 25 computers or 25 bushels of wheat. In Taiwan one unit of labor can make 30 computers or 50 bushels of wheat. Assume that computers and wheat are the only two goods in the world. (What is the purpose of this assumption?)

1. What is Australia's opportunity cost of making a computer? What is Taiwan's opportunity cost of making a computer?

2. What is Australia's opportunity cost of producing a bushel of wheat? What is Taiwan's opportunity cost of producing a bushel of wheat?

3. Does Australia have absolute advantage in producing anything? Explain.

4. Does Australia have comparative advantage in producing anything? Explain.

5. Does Taiwan have comparative advantage in producing anything? Explain.

6. Is it possible for Australia to gain by trading with Taiwan? Explain.

7. Is it possible for Taiwan to gain by trading with Australia? Explain.

8. What are the limiting terms of trade, outside of which exchange between Australia and Taiwan will not occur? (These will be barter ratios, e.g. 2 computers/bushel of wheat.)

Question 6. Omega Inc. is on the front page of Fortune, Forbes, and Bloomberg BusinessWeek for its rapid growth and high profits gained by producing a wide range of high quality, reasonably priced goods. Congressmen praise Omega as an example of successful entrepreneurship.

As it happens Omega is located on an island off the coast of New Jersey. They are noted for their secrecy as much as for their success. All anyone outside of Omega Inc. knows is that raw materials and workers go onto the island and finished goods come out.

One day an investigative reporter manages to sneak on the island. He discovers that Omega is not manufacturing at all – they are an import/export business. When this is revealed the praise turns to bitter criticism. Where Omega had previously been lauded for their efficiency, Congressmen now demand an investigation of this corporation that is stealing American jobs.

1. Is the US any worse off if Omega turns out to be exporting and importing rather than manufacturing? Why?

2. Would it be reasonable to argue that trade is simply an alternate means of production? Explain.

3. The business economist Peter Drucker (Innovation and Entrepreneurship, 1985) once described the activities of entrepreneurs as (1) introducing new products; (2) introducing new processes (i.e. new ways to produce old products); (3) opening up new markets; and (4) discovering new resources and new sources of old resources. Doesn't international trade do these same things? Is there any reason why we should fear international trade any more or less than entrepreneurship? Is it more damaging to lose your job to a low-wage foreigner than it is to lose your job because of a domestic innovation in production that requires less labor?

4. International trade theory suggests that, as two nations move from no trade to free trade, there will be a tendency for the prices of goods to move toward world prices, and also a tendency for the prices of the inputs (wages, rents, etc.) used to produce the goods to converge to a world input price level. This could be part of the explanation for falling or stagnant incomes of many US workers, especially those who are less educated.

5. Is there some reason why US workers should be paid more than Indian or Chinese workers with the same qualifications doing the same work? Are people entitled to be supported in the manner to which they have become accustomed?