EC 390 Problem Set 03

Instructions: Answers must be submitted online through the designated Canvas assignment in a **PDF file**. Any other file type is not allowed. This Problem Set is due on **November 13 at 01:59pm**. Please write as legible and clearly as possible. You will not be given full credit if your answers cannot be easily understood.

Questions

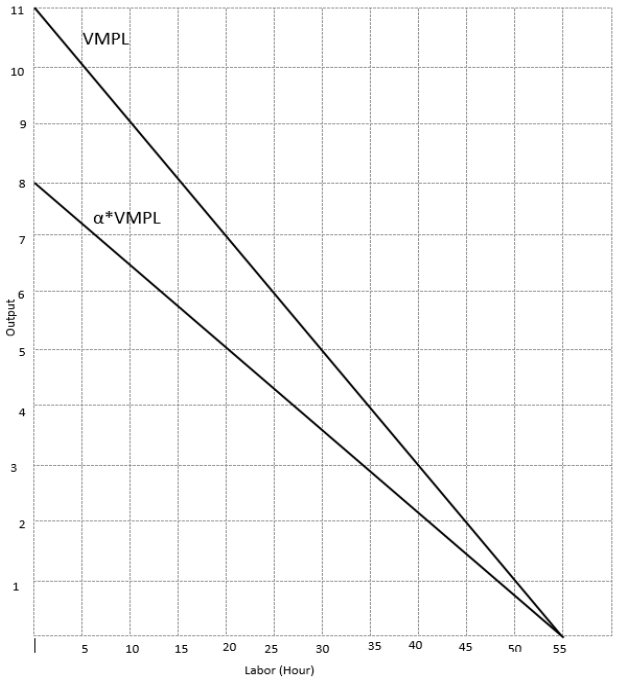
1. Suppose that 2 farmers enter into an agreement where one farmer grows **carrots** and the other grows **leeks**. The table below shows their yields over the past 5 years.

Crop	Year 1	Year 2	Year 3	Year 4	Year 5
Carrots	5	3	8	4	10
Leeks	12	17	0	14	3

   (a) [5 points] Solve for the **expected yield** of **carrots** and **leeks** in year 6. Show your work.

   (b) [4 points] Do **carrots** and **leeks** appear to have a positive or negative covariance? Does this mean that these veggies are a good or bad choice for diversification? (You do not need to calculate the covariance to answer this question)

2. Recall a **sharecropping** agreement is where a farmer provides a percentage of their yield to a landowner in exchange for renting the land. Consider the graph below and answer the following questions (include calculations in your work).



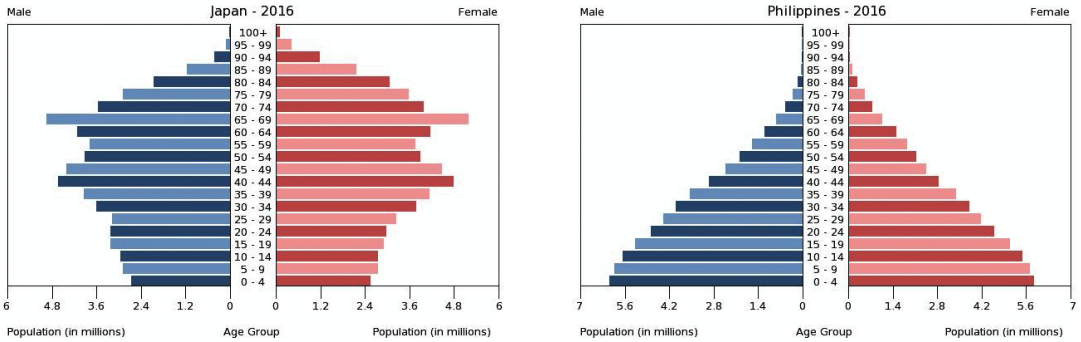
(a) [5 points] Suppose the farmer has to pay 0% of their yield to the landowner, and the farmer's next best alternative is working informally for \$5 an hour. Find the **optimal amount of labor** for the farmer.

(b) [5 points] Now consider the case where the farmer keeps only α% (as shown in the graph). Calculate the **farmer's profit, landlord's profit, and the deadweight loss** associated with this sharecropping agreement. (Answers should be numeric)

(c) [3 points] What is the benefit to the farmer from sharecropping?

3. [2 points] What is **urban bias**? Why can this lead to negative outcomes for society?

4. Use the following graph on population age for the Philippines and Japan to answer the following questions:



(a) [3 points] On average, which country has a younger population?

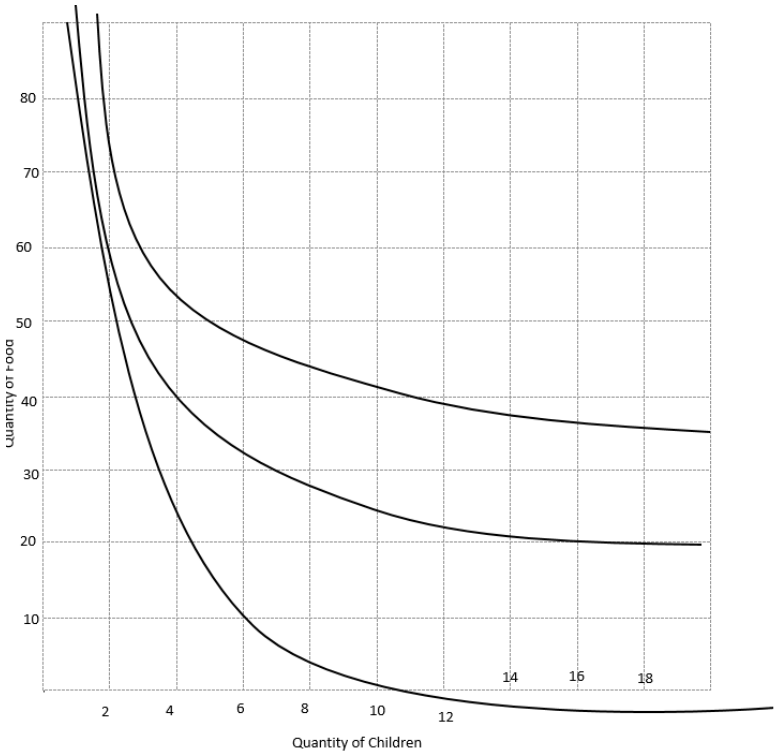
(b) [3 points] How might the age structure of the Philippines influence the **dependency burden** of the Philippines?

(c) [3 points] How might the age structure of Japan influence the **dependency burden** of Japan?

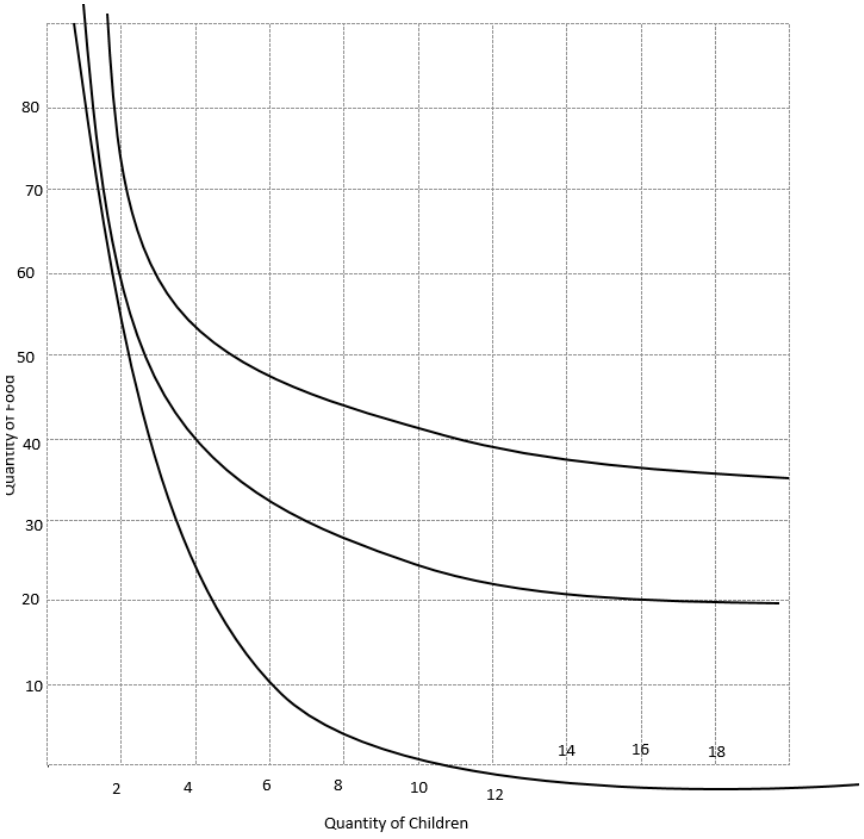
5. Use the following graph on **household preferences** to answer the following questions and show your work for each answer

   (a) [4 points] Suppose the household budget is \$100. If the household **spends all of their budget on children**, they can afford to have 8 children. If they **spend all of their budget on food**, they can afford 40 units. What is the **price of a child and the price of food**?

   (b) [4 points] **On the graph below**, draw the **households budget line** and determine the **optimal number of children** and the **optimal amount of food** the household will consume.



(c) [5 points] Suppose the government is concerned that the fertility rate in the society is too high. To remedy this, the government imposes a "four-child policy". This policy mandates that each household can have at most four children. Under this policy, what is the households **new optimal point of consumption of children and food**?



(d) [4 points] Under the "four-child policy" is the **household better off, worse off, or neither**? How can you tell?