ECO 610
Problem Set #3
Fall 2019

KEY

Instructions: This is a team assignment, so turn in one paper per team. Due 10/8/19.

1. (10 pts.) Your cousin can't decide what to do with her life. Having just gotten a smart phone and downloading the Uber and Lyft apps, she explores becoming a contract driver for one of these taxi services. She comes up with the following information:
   - If she works full time, she can generate $100,000 in revenues each year.
   - She would have to buy a suitable car, which would cost her $25,000.
   - Annual operating expenses for such a car, such as gas, oil, and maintenance, would come to $15,000.
   - Other operating expenses like taxes, insurance, and licenses, would cost $5,000 annually.
   - To buy the car, she would have to take the money out of her savings, where it was earning 6%.
   - Wear and tear on the car would cause its market value to decline by $5000 per year each year she drives for Lyft or Uber.
   - Having just graduated from college last May, she has already turned down several jobs paying $50,000 per year.

   Help her evaluate the annual economic profitability of becoming a contract driver for Uber or Lyft. Explain your reasoning and help her decide what to do.

(1)

Annual income if driving taxi:

Total Revenue:	$100,000		
Total Costs:	$15,000	gas, oil, maintenance	Explicit
	5,000	taxes, insurance, license	Explicit
	1,500	interest earnings foregone on $25,000 @ 6%	Implicit
	5,000	depreciation on car	Implicit
	$50,000	foregone salary on best alternative job	Implicit
	$76,500		

Economic Profit = Total Revenue − Total Explicit Costs − Total Implicit Costs

Economic Profit = $100,000 − $76,500 = $23,500

If she drives a taxi she is $23,500 better off than if she takes another job at $50,000 and keeps her $25,000 in the bank @ 6%.

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Help her evaluate the economic profitability of becoming a taxi driver. What should she do?

(2) Alternative way of looking at this

Dec 31, 2018: $25,000 in bank, no job

1/1/19 → Take other job, keep money in bank

$50,000 salary
$1,500 interest earnings

Dec 31, 2019:

$51,500 income for the year and still have $25K in the bank

1/1/19 → Drive taxi, take $25K out of bank to buy car

+ $100,000 in revenue
− 15,000 gas, oil, maintenance
− 5,000 tax, ins., license
$80,000 net revenue

on Dec 31, 2019, sell car for $20,000 and take $5000 out of net revenue. Put $25,000 back in bank and you have $75,000 to show for your year.

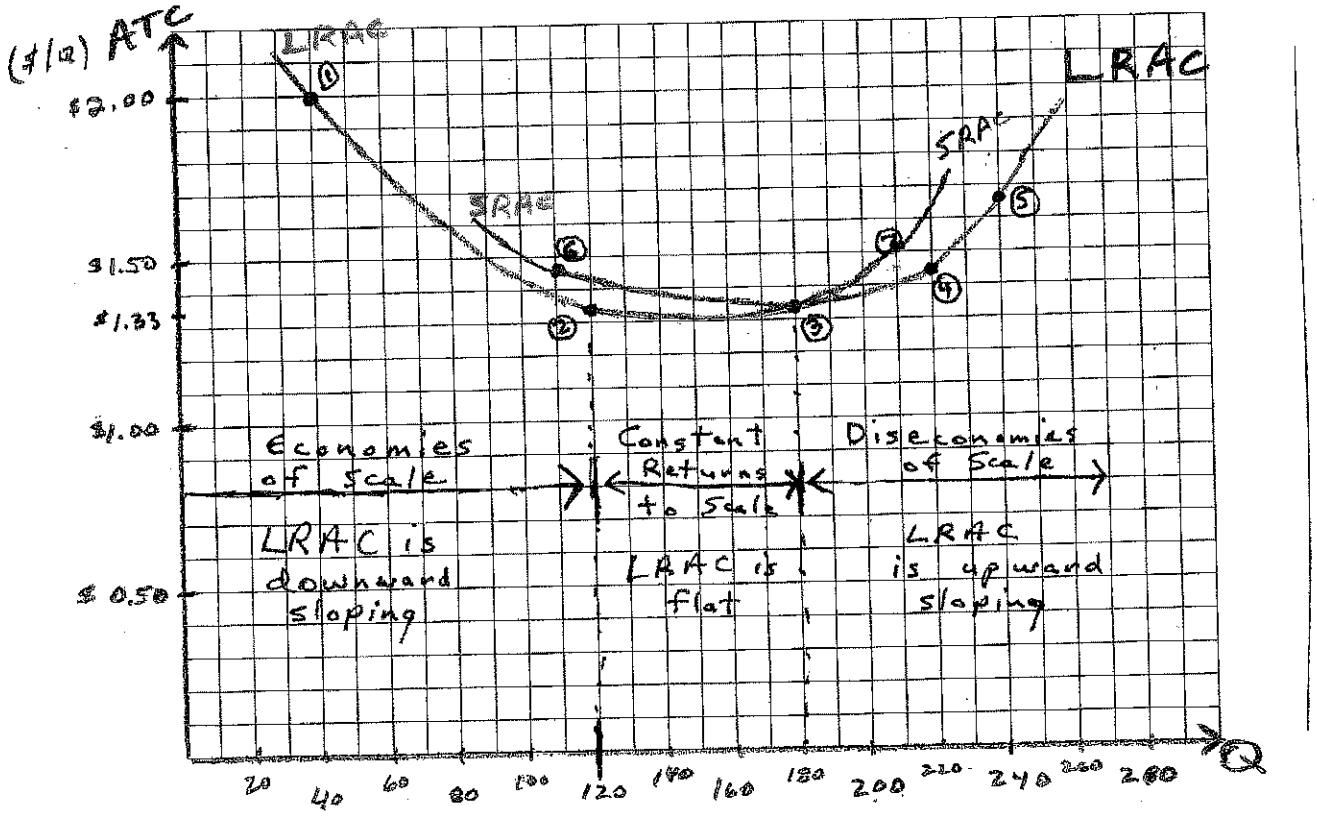
$23,500 better off if drive taxi

2. (15 pts.) Your parents are considering opening a pancake restaurant in a beach resort community along the southern Atlantic coast. They ask you to research the production function relationship between the two key inputs, labor and capital, and the number of meals produced per day. The table below contains the results of your research:

		Labor Input				
		1	2	3	4	5
Capital Input	1	40	80	110	130	150
	2	80	120	150	170	180
	3	110	150	180	200	210
	4	130	170	200	220	230
	5	150	180	210	230	240

K=L for minimum cost. All are points on firm's LRAC

Per unit-prices for labor and capital are w = $40 and v = $40. For this particular production function, when both input prices are the same, the long-run least-cost combination of inputs occurs where K = L. Using this information, graph five points on this firm's long-run average cost curve in the attached diagram. If the market is big enough to support several restaurants like the one they are considering, what size restaurant would you recommend that they build? (In other words, what level of K, where K can be thought of as the flow of capital services per hour embodied in different-sized restaurants?) Explain your answer, using concepts of economies and diseconomies of scale and MES.



MES
[Minimum Efficient Scale]

	L	K	Q	TC	ATC
①	1	1	40	80	$2.00
②	2	2	120	160	$1.33
③	3	3	180	240	$1.33
④	4	4	220	320	$1.45
⑤	5	5	240	400	$1.67

3. (10 pts.) Your parents decide to choose K=3, and build and equip a restaurant of that size. In the short run, they are stuck with K=3 in making short-run production decisions. Most of the year they produce and serve 170-190 meals per day, and seem pretty happy. During the coldest winter months, however, when they are only serving slightly more than 100 meals per day, they gripe about their costs. On peak-demand holiday weekends when they are serving over 200 meals per day, they also gripe. In the diagram on the previous page, plot three points on their SRATC curve corresponding to outputs of 110, 180, and 210 and explain their griping, even though they don't regret their decision to build the size restaurant they did.

for $\bar{K}=3$:

L	Q	TC	ATC	
1	110	160	$1.45	← pt. # ⑥ on graph
2	150	200	$1.33	
3	180	240	$1.33	← pt. # ③ on graph
4	200	280	$1.40	
5	210	320	$1.52	← pt. # ⑨ on graph

When K is fixed at $\bar{K}=3$ and $L=1$, ATC is high because you are underutilizing restaurant capacity — your fixed costs per meal are high. When $\bar{K}=3$ and $L=5$, ATC is high because you are overutilizing capacity — diminishing returns have set in.